Instituto de Ciencias Nucleares UNAM

ALICE

Analysis Update: p_{T} spectra as a function of R_{T} for pp collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV¶

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Tracking efficiency

The tracking efficiency is the result of the reconstructed primary particles over generated primary particles.

$$\varepsilon(p_{\mathrm{T}}) = \frac{N^{\mathrm{MC}}_{\mathrm{prim,rec}}(p_{\mathrm{T}})}{N^{\mathrm{MC}}_{\mathrm{prim,gen}}(p_{\mathrm{T}})}$$

The ”real” tracking efficiency for each particle species is a convolution of the particles decay probability and detector effects.

The rest tracking efficiency is given by the weighted sum of the rest bulk particle tracking efficiencies:

$$\varepsilon_{rest}(p_{\mathrm{T}}) = \sum_{\mathrm{i=e,\mu,\Omega,\Xi}} \frac{N^{\mathrm{MC}}_{\mathrm{i}}(p_{\mathrm{T}})}{N^{\mathrm{MC}}_{\mathrm{rest}}(p_{\mathrm{T}})} \varepsilon_i$$

Particle composition correction factor

The data-driven tracking efficiency can be calculated using:

$$\varepsilon_{incl}(p_{\mathrm{T}}) = \sum_{i=\pi,K,p,\Sigma,rest} f_i(p_{\mathrm{T}})\varepsilon_i(p_{\mathrm{T}})$$

The relative single-particle abundances in Monte Carlo differ from data.

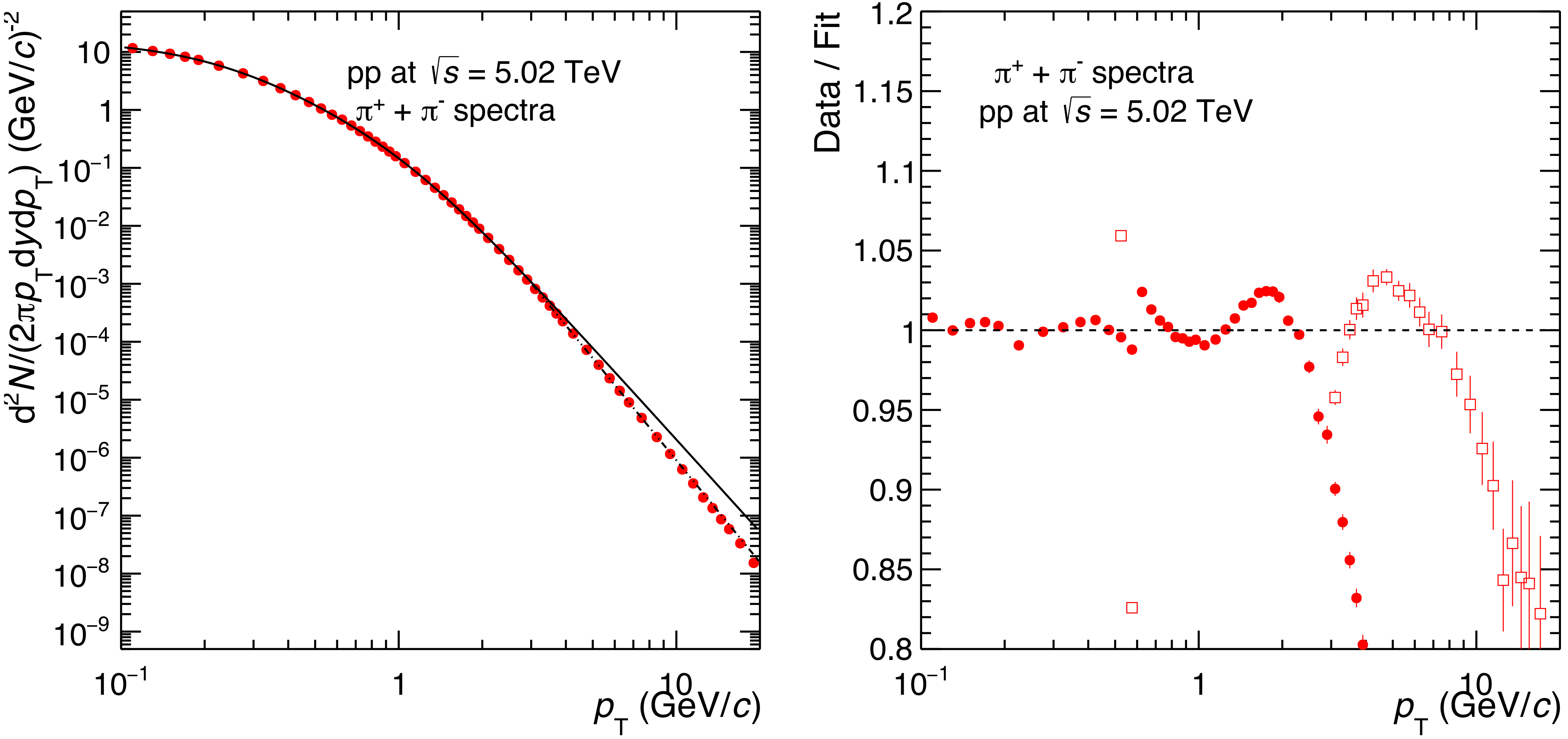
For that reason the tracking efficiency is reweighed with measured particle composition.

The single-particle spectra

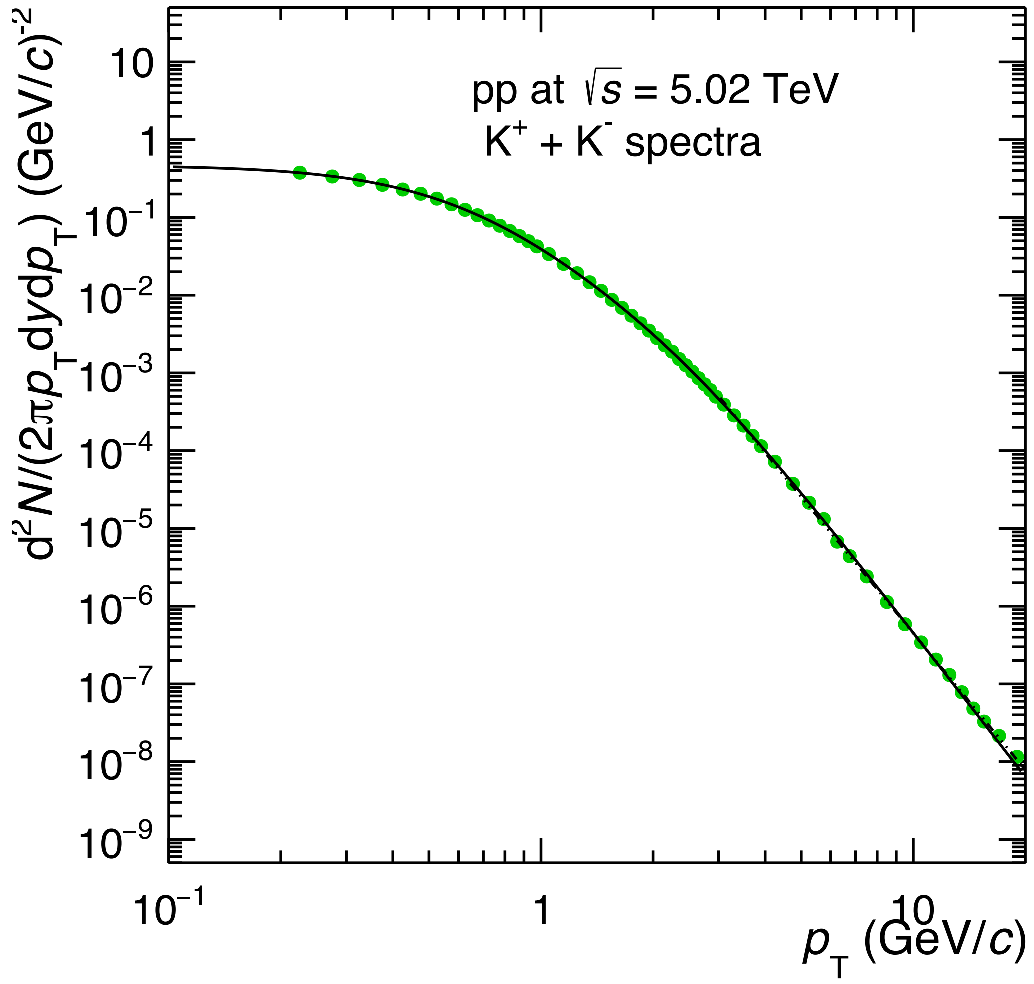
The measured single-particle spectra in pp collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02\ \mathrm{TeV}$ are shown in the next figures:

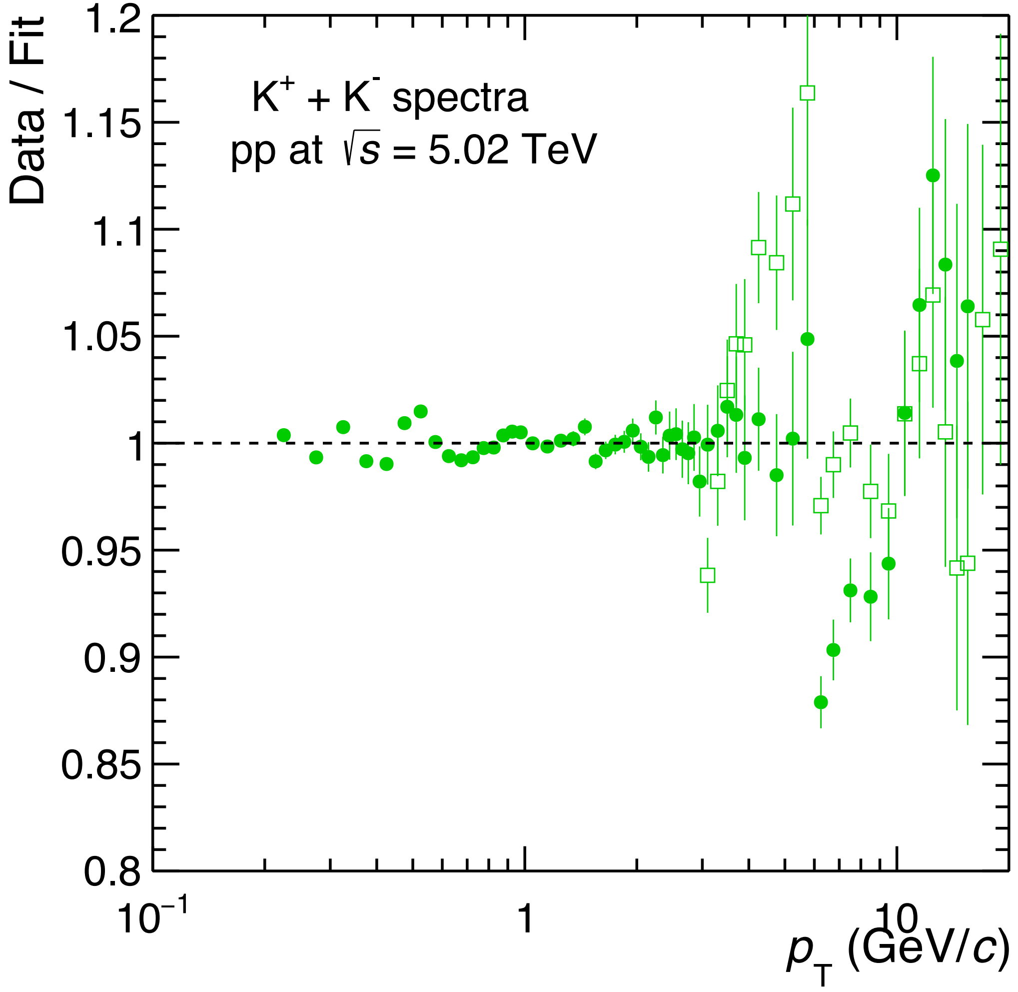
- ✦ considering a fit for low-p_{T} because the spectra does not cover the full transverse-momentum range of $p_{\mathrm{T}} < 0.5$ GeV.
- ✦ shown also a power law to $p_{\mathrm{T}} > 3$ GeV.

The single-particle spectra

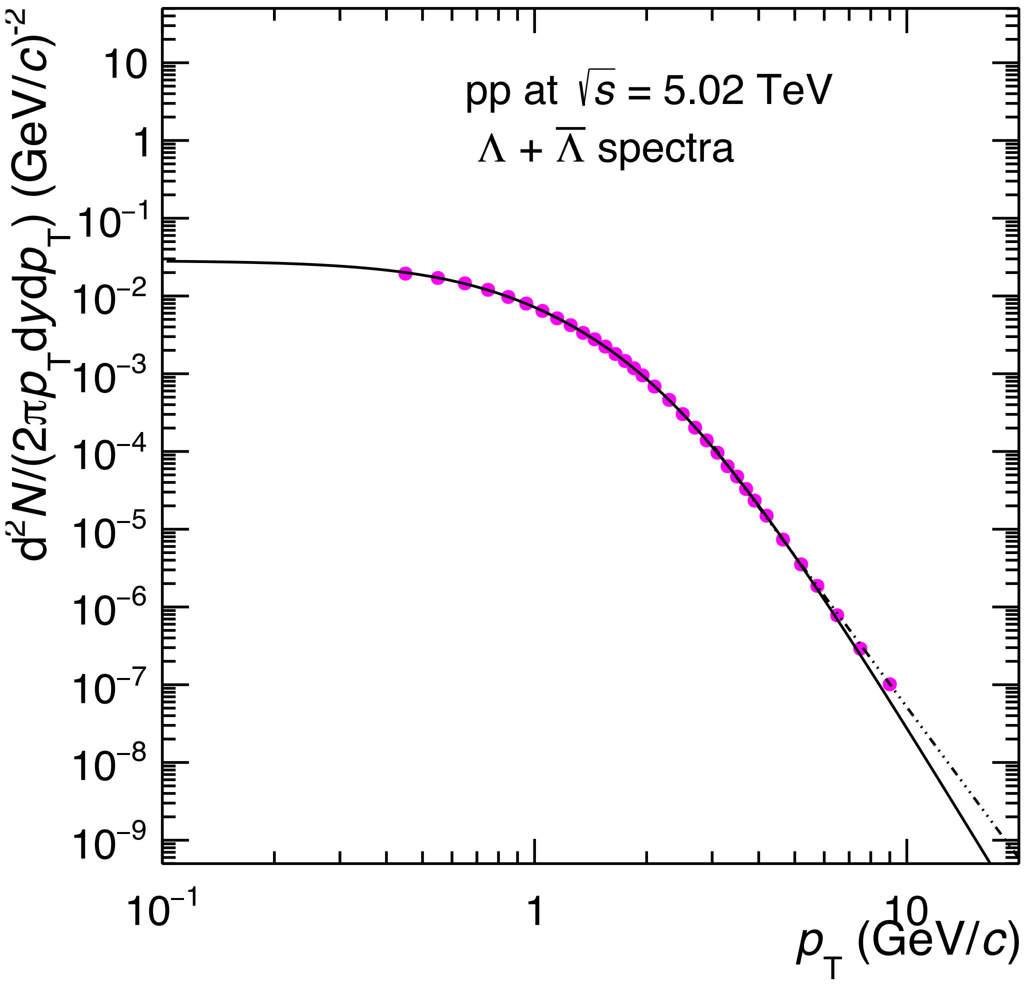


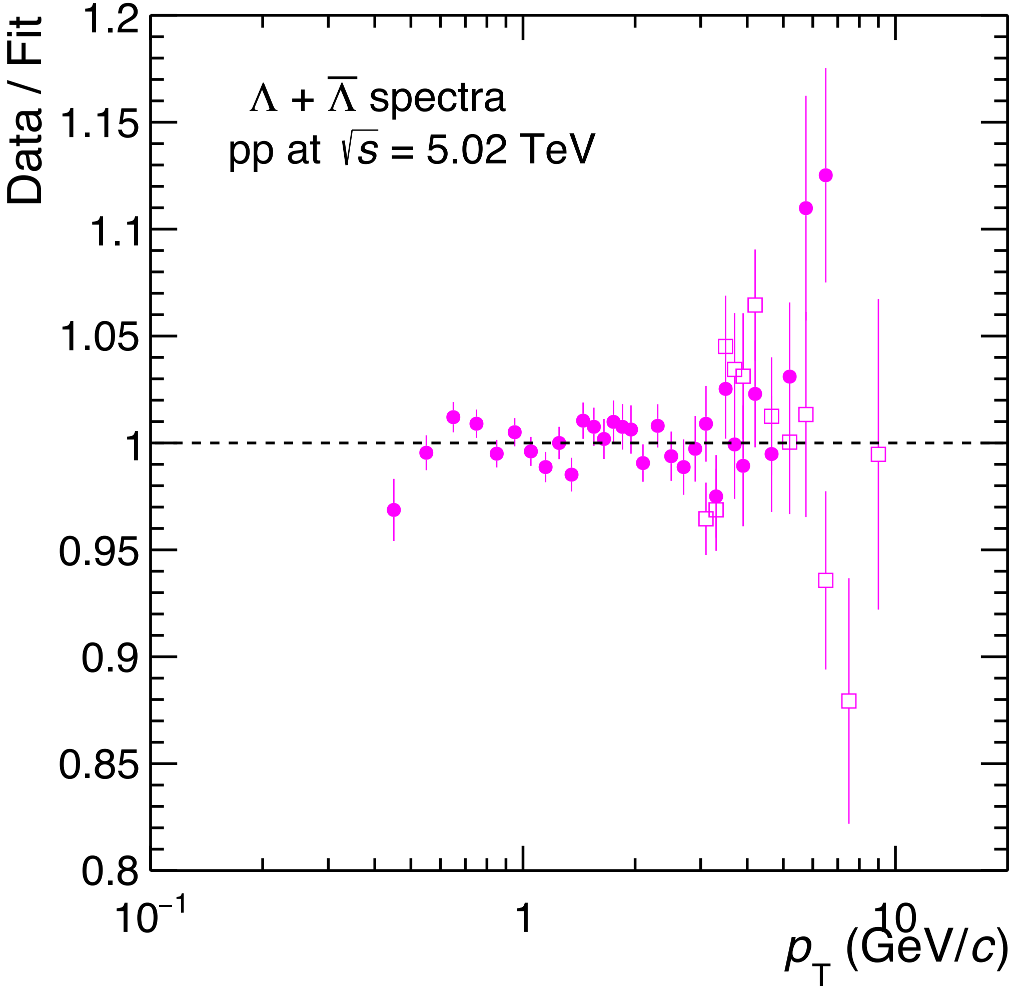
The single-particle spectra



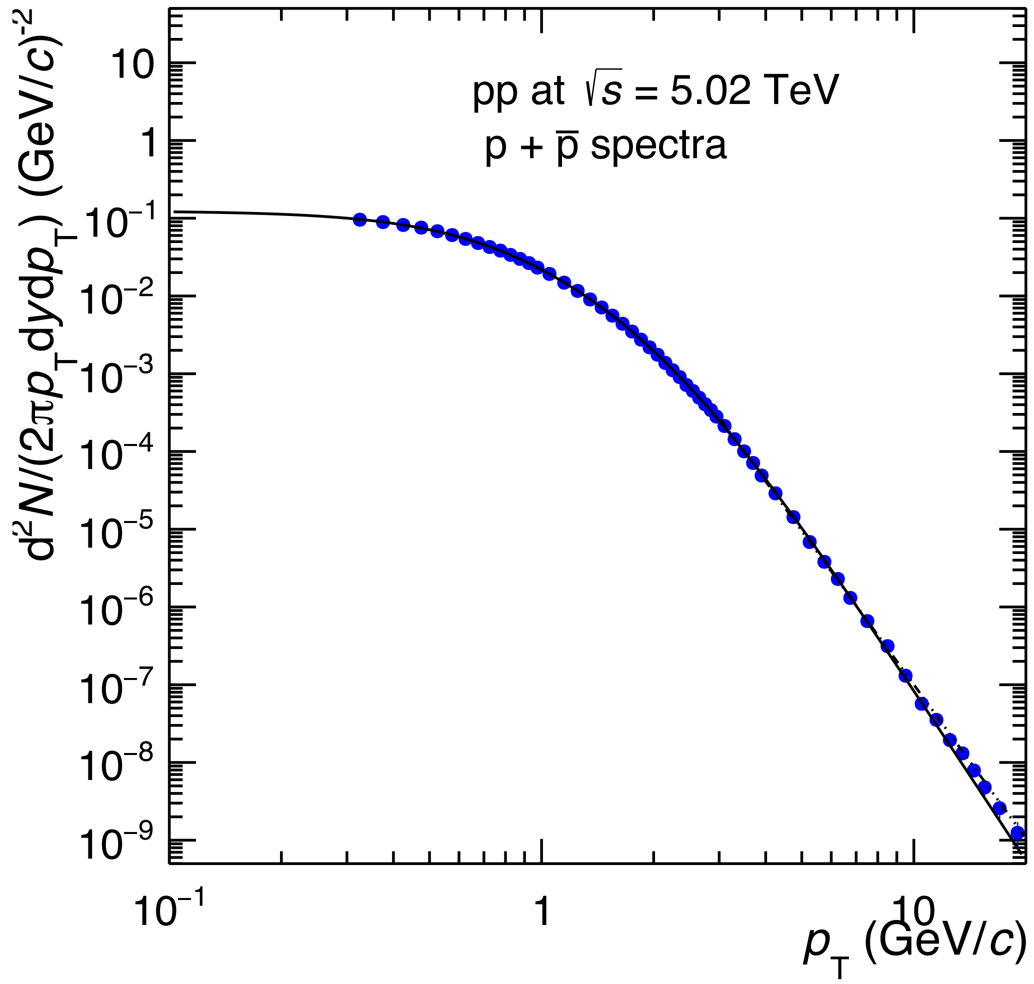


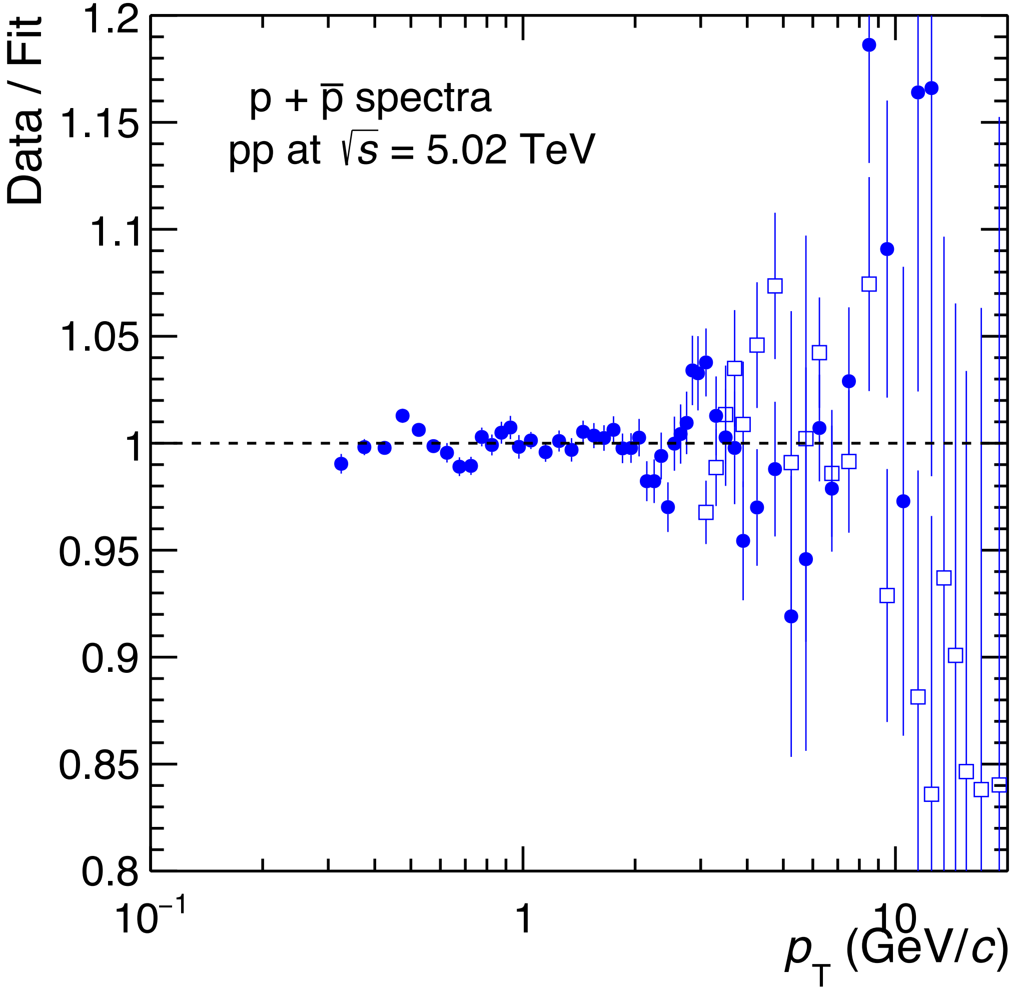
The single-particle spectra





The single-particle spectra





Construction of Σ^{+} and Σ^{+} spectra

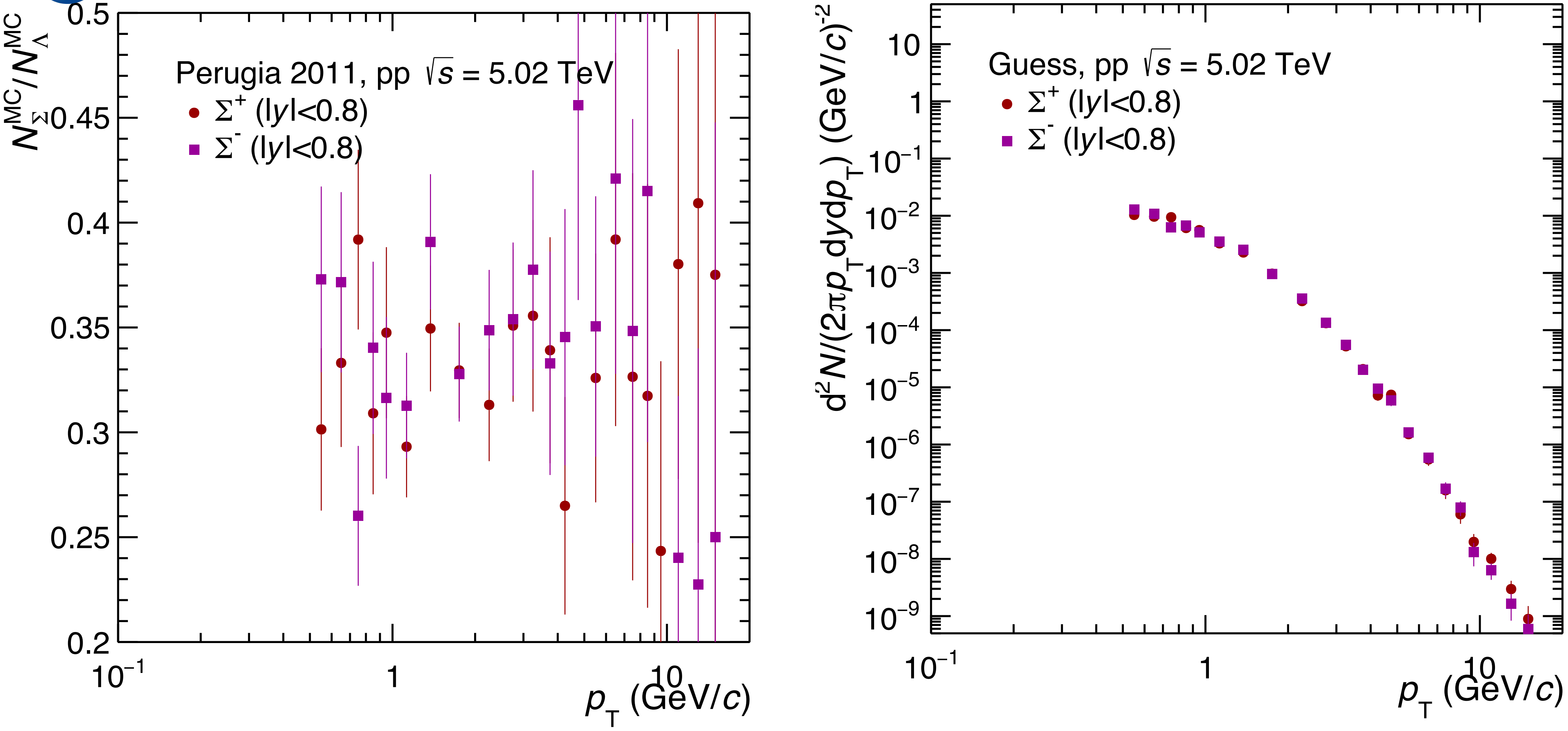
Since there is no measurement of Σ+ and Σ- particles as well as their corresponding antiparticles, their similarity in composition with Λ is exploited to construct a realistic Σ+ and Σ- spectrum.

$$\Sigma^{+}(uus) \qquad \Sigma^{-}(dds) \qquad \Lambda(uds)$$

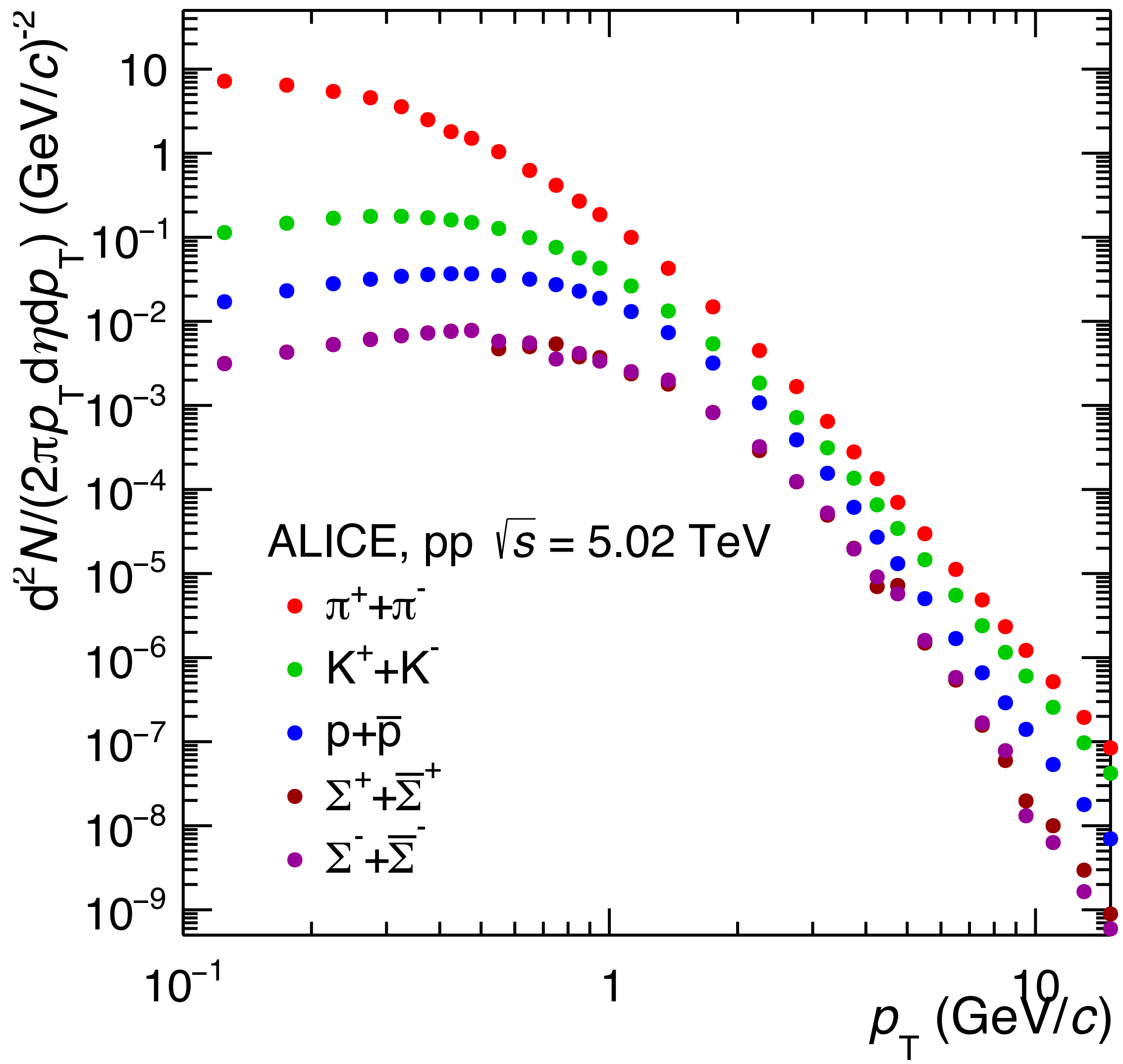
The procedure uses the following formula:

$$N^{const}_{\Sigma^{+/-}}(p_{\mathrm{T}}) = \frac{N^{\mathrm{MC}}_{\Sigma^{+/-}}(p_{\mathrm{T}})}{N^{\mathrm{MC}}_{\Lambda}(p_{\mathrm{T}})} N^{\mathrm{mes}}_{\Lambda}(p_{\mathrm{T}})$$

Construction of Σ^+ and Σ^+ spectra



The single-particle spectra



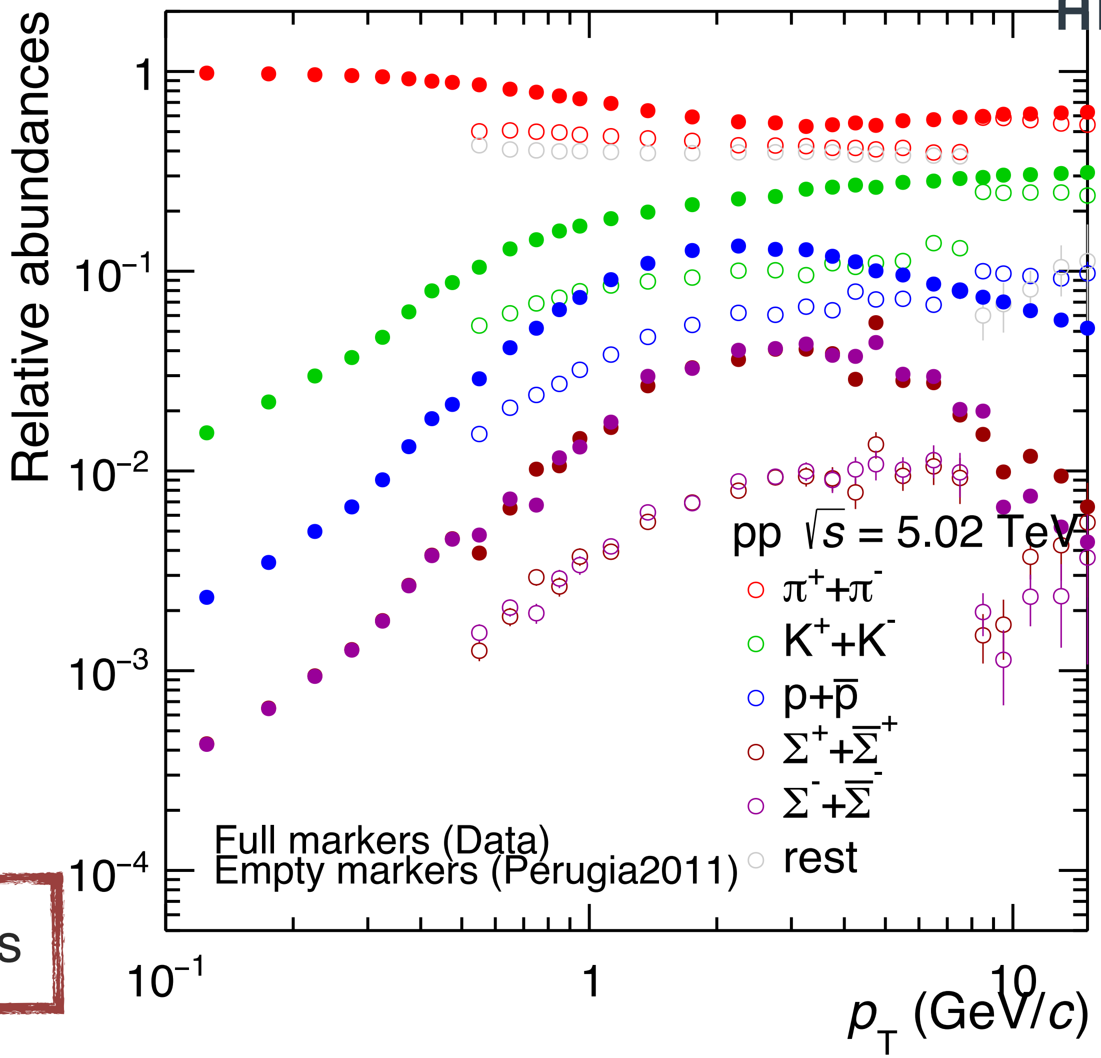
Relative abundances

The particle composition is dominated by π's, K's, p's and Σ's however the bulk of rest particles contains e's, μ's, Ω's and Ξ's.

The relative fractions of all particle species can be calculated by

$$f_i = \frac{N_i}{\sum_{j=\pi,K,p,\Sigma,rest} N_j}$$

In progress



Thank you