

Resultados del paper sobre la producción de mesones neutros (π^0 y η) en colisiones p-Pb a $\sqrt{s_{NN}} = 5.02$ TeV

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The results of the neutral meson production in p-Pb paper at $\sqrt{s_{NN}} = 5.02$ TeV will be shown.

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Neutral pion and η meson production in p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV

ALICE Collaboration*

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Abstract Neutral pion and η meson invariant differential yields were measured in non-single diffractive p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV with the ALICE experiment at the CERN LHC. The analysis combines results from three complementary photon measurements utilizing the PHOS

elucidate the effects of cold nuclear matter on a wide range of observables of the QGP [2,3].

Measurements of inclusive distributions of hadrons at mid-rapidity at the LHC probe parton fractional momentum x in the range $10^{-4} < x < 10^{-2}$ where nuclear modi-

PWG: PWG-GA (Photons, Neutral Mesons)

Format: Regular Paper

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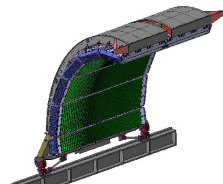
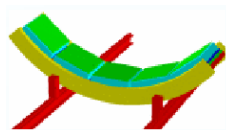
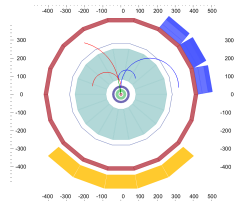
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The study of the π^0 and η mesons production is important regarding:

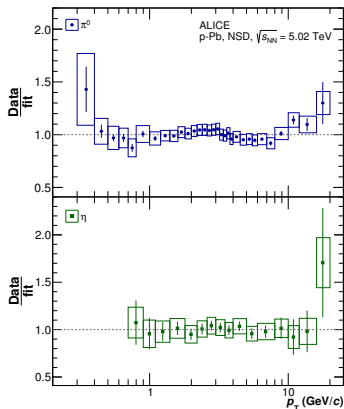
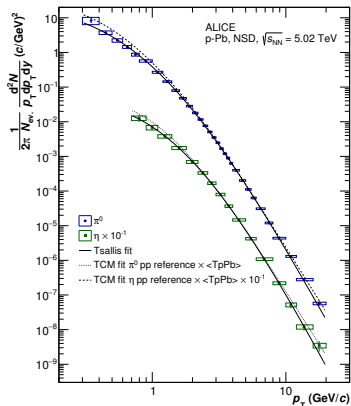
- p-Pb collisions
 - Test of pQCD NLO predictions. Possibility to constrain Parton Distribution Functions (PDFs) and Fragmentation Functions (FFs).
 - Cross check model calculations and event generators: CGC, PYTHIA, PHOJET, HIJING, etc.
 - As control experiment to disentangle initial/final state effects for the particle suppression observed in Pb-Pb collisions
 - Input for direct photon measurement as π^0 and η mesons are the main source of background of photons.

γ detection in ALICE

- Photon Conversion Method (PCM):
Photon conversion in detector material ITS and TPC $X/X_0 = 11.4 \pm 0.5$ sys % $|\eta| < 0.9, 0^\circ < \Phi < 360^\circ$.
- PHOS calorimeter:
 - PbWO_4 crystal
 - 3 modules at 4.6 m from the ALICE IP.
 - $|\eta| < 0.7, 80^\circ < \Phi < 180^\circ$
- EMCal calorimeter:
 - 77 layers 1.4 mm lead + 1.7 mm scintillator
 - 10 modules at 4.4 m from ALICE IP.
 - $|\eta| < 0.7, 80^\circ < \Phi < 180^\circ$



Results: Meson Yields in p-Pb collisions



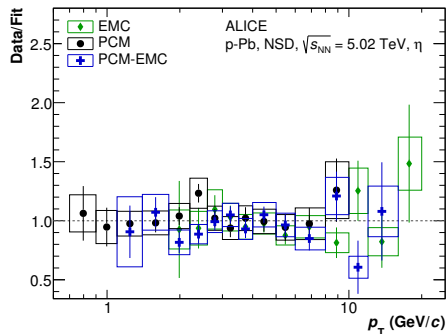
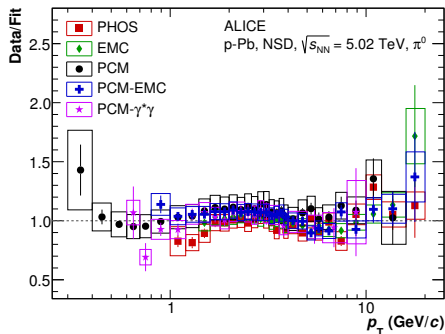
Invariant differential meson yields were measured in a wide transverse momentum range of:

π^0 : $0.3 < p_T < 20$ GeV/c

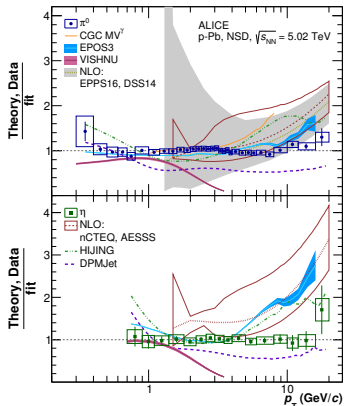
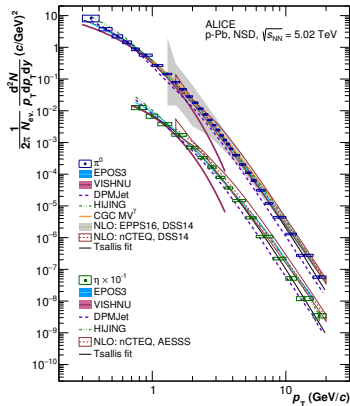
η : $0.7 < p_T < 20$ GeV/c

Consistency between different methods

The meson yields were obtained combining results from different reconstruction methods. All measurements are consistent within uncertainties over the all p_T range.

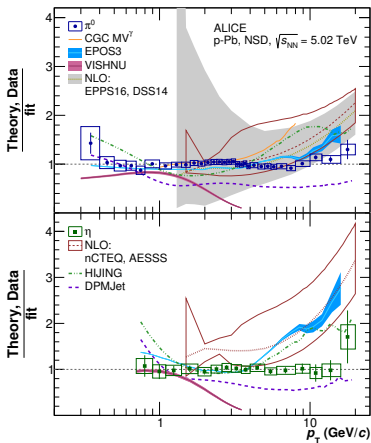


Comparison to theoretical calculations



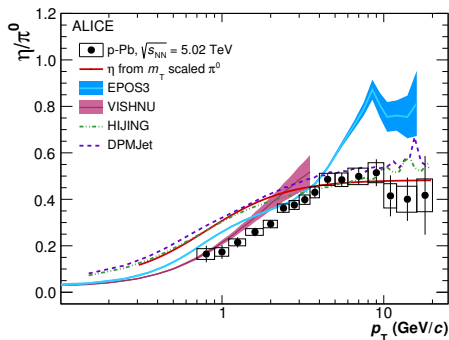
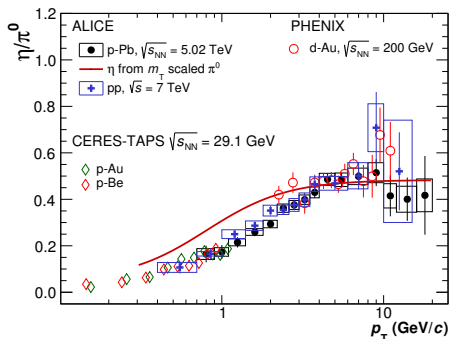
pQCD calculations reproduce the π^0 spectrum within the uncertainties, whereas they describe the η spectrum at intermediate p_T and overestimate it to a factor of two at high p_T .

Comparison to theoretical calculations



- HIJING agrees with the η spectrum at intermediate p_T (1-4 GeV/c) but at lower and higher p_T it overestimates the π^0 and η spectra.
- DPMJET reproduces the π^0 and η spectra for $p_T < 1$ GeV/c, but it underestimates the yields at higher p_T
- CGC: agrees with the π^0 for $p_T < 5$ GeV/c
- iEBE-VISHNU: agrees for $0.7 < p_T < 1.5$ GeV/c
- EPOS3: reproduces the π^0 spectrum over the full measured range, whereas it reproduces η spectrum only for $p_T < 4$ GeV/c.

Consistency between different methods

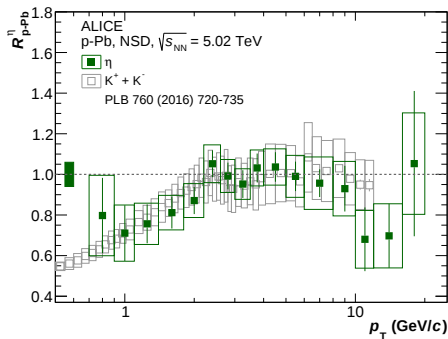
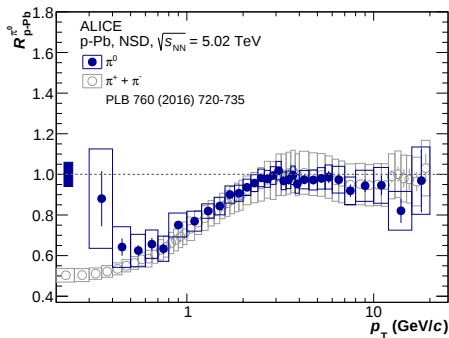


HIJING and DPMJET close to the m_T scaling prediction.

EPOS3: close to the measured π^0/η ratio

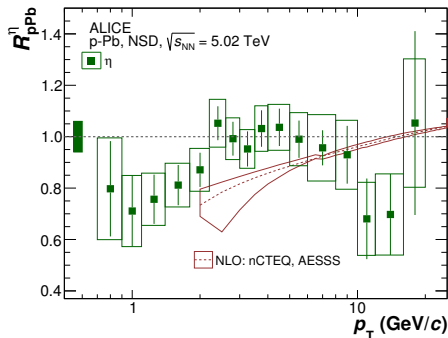
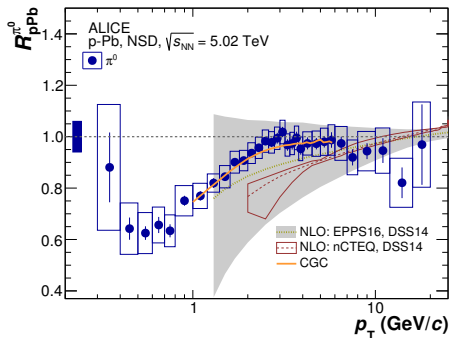
iEBE-VISHNU: agrees with the measured data

Nuclear Modification Factor



RpPb compatible with unity for $p_T > 2$ GeV/c. RpPb of neutral mesons agree with charged pions and charged kaons, respectively.

Nuclear Modification Factor



CGC: reproduces the π^0 RpPb

NLO reproduces the RpPb within the errors.

Summary

- The invariant π^0 and η meson yields were measured in p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV. The results are an important input for model calculations that describe particle production at the LHC energies. They can also add constraints to PDFs and FF.
- The reported η/π^0 ratio shows a deviation from the “mT scaling” at low pT. Similar behaviour was also observed in pp collisions at 2.76, 7 and 8 TeV. A possible explanation could be the presence of radial flow effects to the η and π^0 production.
- The nuclear modification factors (RpPb) of π^0 and η were also reported. They are compatible with unity for $pT > 2$ GeVc supporting the idea that the suppression observed in central Pb-Pb collisions is due to the parton energy loss in the hot QCD medium.