

HK 18: Heavy Ion Collision and QCD Phases V

Zeit: Dienstag 14:00–15:30

Raum: S1/01 A4

HK 18.1 Di 14:00 S1/01 A4

Neutral meson measurement via photon conversions in p-Pb collisions with ALICE at the LHC — ●ANNIKA PASSFELD for the ALICE-Collaboration — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Germany

The measurement of particle production in p-Pb collisions at high LHC energies allows the study of fundamental properties of quantum chromodynamics (QCD) at low parton momentum fraction x and high gluon densities.

Moreover it is important as reference for heavy ion collisions. It can show whether the initial state of the colliding nuclei plays a role in the observed suppression of hadron production at high p_T in Pb-Pb collisions. The measurement of neutral pions has the advantage of large statistics of identified particles over a relatively large transverse momentum range. In addition, the neutral pion and η spectra are crucial for the background determination of other analyses like the direct photon measurement.

In this talk the $\pi^0 \rightarrow \gamma\gamma$ and $\eta \rightarrow \gamma\gamma$ analyses using photon conversions will be presented. Differential invariant cross sections as well as the nuclear modification factor R_{p-Pb} will be shown for minimum bias collisions and different charged particle multiplicities for both mesons.

HK 18.2 Di 14:15 S1/01 A4

Statistical model analysis of hadron yields at SIS energies — ●MANUEL LORENZ for the HADES-Collaboration — Goethe Universität

The HADES data from p+Nb collisions at center of mass energy of $\sqrt{s_{NN}} = 3.2$ GeV are analyzed by employing a statistical model. Accounting for the identified hadrons π^0 , η , Λ , K_s^0 , ω allows a surprisingly good description of their abundances with parameters $T_{chem} = (99 \pm 11)$ MeV and $\mu_b = (619 \pm 34)$ MeV, which fits well in the chemical freeze-out systematics found in heavy-ion collisions. In supplement we reanalyze our previous HADES data from Ar+KCl collisions at $\sqrt{s_{NN}} = 2.6$ GeV as well as the recent Au+Au data at $\sqrt{s_{NN}} = 2.4$. Comparing the description of yields and the regularity of freeze-out parameters obtained from the three samples, we discuss equilibration in heavy-ion collisions in this energy regime. Supported by BMBF (05P12RFGHJ,05P15RFFCA), GSI and HIC for FAIR.

HK 18.3 Di 14:30 S1/01 A4

Neutral meson production in pp and p-Pb collisions measured with ALICE calorimeters — ●FABIAN PLIQUETT for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

ALICE as the dedicated heavy-ion experiment at the LHC is designed to investigate the properties of the quark-gluon plasma. The measurement of neutral meson production complements other measurements of identified particles in the experiment. pp and p-Pb collisions function as control experiments to facilitate a better understanding of particle production in heavy-ion collisions.

PHOS and EMCal, the electromagnetic calorimeters of the experiment, measure the energy and position of photons and therefore allow for the reconstruction of neutral mesons via their two-photon decay channel.

The status of the neutral meson measurement in pp and p-Pb collisions with the ALICE PHOS and EMCal will be presented.

Supported by BMBF and the Helmholtz Association.

HK 18.4 Di 14:45 S1/01 A4

Measurement of neutral mesons via combination of calorimeter and conversion photons in pp collisions with ALICE at the LHC — ●DANIEL MÜHLHEIM for the ALICE-Collaboration — Institut für Kernphysik, Westfälische-Wilhelms Universität Münster

The ALICE experiment is dedicated to the investigation of the so-called Quark-Gluon Plasma (QGP) which is created in highly energetic Pb-Pb collisions. In order to identify and understand the effects

which are not related to the creation of the QGP, the analysis of pp collisions plays an important role. One point of general interest is the measurement of photons. They can be regarded as an ideal probe to study the QGP, since they do not participate in the strong interaction. Hence, they are able to escape the medium unaffected.

There are two different principles to measure photons in ALICE. One way is to make use of electromagnetic calorimeters. The other possibility is to look for photon conversions which occur within the detector material. Both detection principles are combined in order to reconstruct neutral mesons. Since the two detection systems are independent, this method provides an important cross-check for the respective systems. It also profits from the excellent resolution of the conversion method as well as from the high reconstruction efficiency of a calorimeter.

I will introduce this so-called hybrid method in detail and present the current status of neutral meson analysis in pp collisions. Moreover, a first look into the direct photon extraction will be presented.

HK 18.5 Di 15:00 S1/01 A4

Contribution submission to the conference Darmstadt 2016

Measurement of the η meson in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV in the ALICE experiment at LHC — ●LUCIA LEARDINI for the ALICE-Collaboration — Physikalische Institut Heidelberg

Neutral mesons are probes for studying the energy loss of partons traversing the hot and dense medium, the Quark-Gluon Plasma, that is formed in heavy-ion collisions. Moreover, the study of π^0 and η mesons in Pb-Pb collisions is necessary for the direct-photon measurement as these mesons constitute its most important background. The η meson production in the transverse momentum range $1 < p_T < 20$ GeV/c has been measured at midrapidity by the ALICE experiment at the Large Hadron Collider (LHC) in central and semi-central Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV. The low p_T part of the measurement relies on the Photon Conversion Method (PCM), based on the reconstruction of photon conversions by the Inner Tracking System (ITS) and the Time Projection Chamber (TPC). The ALICE Electromagnetic calorimeter (EMCal) provides the high p_T part of the neutral mesons spectra.

The η invariant yields, η/π^0 ratio and ηR_{AA} will be shown and compared to predictions.

HK 18.6 Di 15:15 S1/01 A4

Measurement of η mesons produced in p-p collisions at $\sqrt{s_{NN}} = 13$ TeV with ALICE — ●MEIKE DANISCH for the ALICE-Collaboration — Physikalisches Institut der Uni Heidelberg

Studying proton-proton collisions with ALICE at the LHC can not only be used to test predictions from Quantum Chromodynamics (QCD), but is also an important step towards the analysis of Pb-Pb collisions. Comparing the results of both analyses, one can study the hot and dense state of matter which is produced in heavy ion collisions. Neutral mesons can, for example, provide information on the energy loss of partons traversing the Quark Gluon Plasma (QGP). Furthermore, they constitute the largest background contribution for direct photons, which are also a very important tool to study the properties of the QGP. In the ALICE experiment, neutral mesons can be measured via their decay to two photons. Apart from the two calorimeters EMCal and PHOS, photons can be reconstructed also via the so-called Photon Conversion Method (PCM). The latter exploits the fact that a photon can convert to an electron-positron-pair. These charged particles can be detected via their tracks in the Time Projection Chamber (TPC) and the Inner Tracking System (ITS). The PCM allows for the precise measurement of both photons and neutral mesons, especially at low transverse momenta. Apart from shortly introducing the photon conversion method, first results of the η meson analysis, using data from p-p collisions at the world's highest center-of-mass collision energy of 13 TeV per nucleon, will be shown.