HK 65: Heavy-Ion Collisions and QCD Phases XII

Time: Thursday 15:45–17:15 Location: SCH/A216

HK 65.1 Thu 15:45 SCH/A216

Reconstruction of neutral mesons via photon conversion method in Ag-Ag collisions at 1.58A GeV with HADES* — •Tetiana Povar for the HADES-Collaboration — Bergische Universität Wuppertal,Wuppertal,Germany

The High Acceptance DiElectron Spectrometer (HADES) situated at GSI Darmstadt, Germany, aims to measure nuclear matter at high densities and medium temperatures by means of heavy ion collisions. As leptons do not interact strongly with the formed medium in all stages of such collisions, electrons and positrons can provide information about the full fireball evolution. Hence, the study of virtual photons and their decay into electron pairs $\left(e^- + e^+\right)$ are one of the main goals in the HADES physics program.

The major background in the di-electron spectrum at low invariant masses are Dalitz-decays of light neutral mesons. Hence, precisely extracting the yields of neutral mesons produced in the collisions is necessary for proper background subtraction in all di-electron analyses.

In this talk we will present preliminary results on the transverse mass and rapidity resolved π^0- and η-production yields in Ag-Ag collisions measured with HADES via the photon conversion method at 1.58A GeV incident beam energy.

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HK 65.2 Thu 16:00 SCH/A216

Measurement of neutral meson production with ALICE — •Nicolas Strangmann for the ALICE Germany-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment at CERN-LHC investigates the properties of hot and dense nuclear matter created in heavy-ion collisions. Measurements of identified particle production in pp collisions not only serve as reference for larger collision systems, but also help to study different aspects of hadronisation. This contribution will focus on the production of neutral mesons in different collision systems. A precise determination of the neutral meson production can help constrain theoretical models and provide vital input for direct photon analyses.

In ALICE, different detectors and detector combinations are used to reconstruct neutral mesons (π^0 and η) via their two photon decay channel. These photons can be detected in the calorimeters or via their conversion-electron tracks in ALICE tracking detectors. ω mesons can be reconstructed via their three pion decay $\omega \rightarrow \pi^+\pi^-\pi^0$.

In this talk, an overview of the π^0, η and ω measurements with ALICE will be presented. This includes a multiplicity dependent measurement of π^0 and η in pp collisions at $\sqrt{s}$=13 TeV as well as ω measurements in pp and p–Pb collisions.

Supported by BMBF and the Helmholtz Association.

HK 65.3 Thu 16:15 SCH/A216

Characterising the hot and dense fireball with virtual photons at HADES — •Niklas Schild für die HADES-Kollaboration — Technische Universität Darmstadt, 64289 Darmstadt, Germany

Electromagnetic probes (γ, γ^*) offer a unique opportunity to study the conditions in heavy-ion collisions throughout their whole evolution. Since they can escape the strongly interacting medium, they may bring direct information from their origins to a detector.

In this contribution, we present measurements of such dileptons from Ag+Ag collisions, collected at the High-Acceptance-DiElectron-Spectrometer (HADES), at $\sqrt{s_{NN}}$ = 2.55 GeV. A particular focus is set on the multidifferential analysis of the anisotropic flow in terms of centrality, rapidity, transverse momentum and invariant mass. Through the isolation of the in-medium contribution, this will allow insights into the flow at early stages of the collision, and therefore into the time evolution of the system's collectivity as a whole.

HK 65.4 Thu 16:30 SCH/A216

Measurement of photon and light neutral meson production in p–Pb collisions at $\sqrt{s_{\mathrm{NN}}}$ = 5.02 TeV — •Stefanie Mrozinski for the ALICE Germany-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment at CERN-LHC is designed to study the characteristics of the hot and dense nuclear matter created in heavy ion collisions, the quark-gluon plasma (QGP). Since direct photons escape the medium unaffected during all collision states, they offer unique analysis opportunities. A necessary prerequisite for the direct photon measurement is the precise determination of the inclusive photon as well as the neutral meson production.
In ALICE, the measurements of photons is realized using electromagnetic calorimeters (EMCal or PHOS) and a photon conversion method (PCM). For the reconstruction of the mesons via their two-photon decay channel, photons from the same calorimeters or method as well as photons from a calorimeter and the PCM method can be used.
This talk will focus on the reconstruction of π^0 and η meson spectra as well as the measurement of the inclusive photon yield in p–Pb collisions at $\sqrt{s_{\mathrm{NN}}}$ = 5.02 TeV using the PCM-PHOS reconstruction method. The current status of the analyses will be presented.
Supported by BMBF and the Helmholtz Association.

HK 65.5 Thu 16:45 SCH/A216

Topological separation of dielectron signals in Pb–Pb collisions with ALICE — •Jerome Jung for the ALICE Germany-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

Dielectrons are an exceptional tool to study the evolution of the medium created in heavy-ion collisions. In central collisions, the energy densities are sufficient to create a quark-gluon plasma (QGP). Thermal e^+e^- pairs with invariant mass around 1.5 GeV/c^2 can be used to estimate the temperature of the QGP.

At LHC energies, correlated HF hadron decays dominate the dielectron yield for invariant masses above 1.1 GeV/c^2. Their contribution is modified in the medium compared to elementary collisions to an unknown extent, leading to large uncertainties in the subtraction of known hadronic sources. The proper decay length of HF hadrons is of the order of $c\tau \approx 100 - 500$ μm, hence their reconstructed decay electrons do not point to the primary vertex of the collision. Therefore, a topological separation based on the distance-of-closest approach (DCA) to the primary vertex is a promising alternative approach to disentangle them from the prompt contribution of thermal dielectrons.

In this talk, the newest results on the DCA_{ee} spectra of dielectrons produced in Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}}$ = 5.02 TeV with ALICE will be presented. The measurements are compared to reference distributions from simulations and expectations from theory. The presentation will conclude with a discussion of novel developments of the dielectron analysis.

HK 65.6 Thu 17:00 SCH/A216

Measurement of neutral pions in PbPb collisions in ALICE at sqrt(s_NN) = 5TeV — •Stephan Stiefelmaier for the ALICE Germany-Collaboration — Physikalisches Institut Heidelberg

Neutral pion and eta mesons are responsible for a large fraction of secondary photons in the measurement of direct photons what makes their measurement important. I present the current state of the measurement of neutral mesons with the photon conversion method with the 2018 PbPb data sample using the latest reconstruction and calibration methods.