HK 31: Heavy Ion Collisions and QCD Phases V

Zeit: Mittwoch 14:00–15:45 Raum: HZO 60

Gruppenbericht HK 31.1 Mi 14:00 HZO 60

Low-mass dielectron measurements in pp, p-Pb and Pb-Pb collisions with ALICE at the LHC — •Raphaelle Bailhache for the ALICE-Collaboration — Institut für Kernphysik, Frankfurt, Deutschland

Low-mass dielectron measurements play a key role in the study of the Quark-Gluon Plasma (QGP) created in relativistic heavy-ion collisions. At low mass, the dielectron yield is sensitive to the properties of vector mesons in the dense medium and effects due to the chiral symmetry restoration. In the intermediate mass range, dielectrons originate mainly from semielectronic decays of correlated charm and beauty hadrons, which carry information on the energy loss and thermalisation of heavy quarks in the QGP. Finally, thermal radiations from the medium contribute to the dielectron yields in a broad mass range and provide information on the temperature of the medium. To be able to study the QGP signal characteristics, pp collisions are used as vacuum reference, whereas p-Pb collisions allow the study of the cold-matter effects. Moreover, observations of collective effects in high-multiplicity pp and p-Pb collisions show surprising similarities with those in heavy-ion collisions. In this talk, we will present an overview of the dielectron measurements with ALICE at the LHC in pp, p-Pb and Pb-Pb collisions. Its implications for the production of heavy quarks and virtual photons, will be discussed, as well as possible modifications of the dielectron yield in high-multiplicity pp collisions and in Pb-Pb collisions. Finally, we will report on the analysis of pp data taken with a low-magnetic field configuration of ALICE for Run-3.

HK 31.2 Mi 14:30 HZO 60

Azimuthal Anisotropy of Virtual Photons in Au+Au Collisions at $\sqrt{s_{NN}} = 2.4\,GeV$ — •Dominique Dittert for the HADES-Collaboration — TU Darmstadt

Virtual photons, that decay into dileptons, are penetrating probes which directly access the entire space-time-evolution of the fireball and escape from the collision zone without further interactions. Thus they provide unique information about the various stages of the collision. Collective observables like flow are used to describe the macroscopic properties of nuclear matter. Since the effective temperature extracted from the m_T spectra of dileptons results from the superposition of all fireball stages with decreasing temperature T but increasing radial flow over time, it is difficult to disentangle early and late emission sources. In comparison, the elliptic flow does not show this implicit time dependence and the combined dependence of elliptic flow of dileptons on their transverse momentum and their invariant mass provides a rich landscape of structures, which allows to set the observational window on specific stages of the fireball evolution. In this contribution the preliminary results on azimuthal anisotropy of e^+e^- excess radiation measured in Au+Au collisions at $\sqrt{s_{NN}} = 2.4\,GeV$ with HADES will be presented.

HK 31.3 Mi 14:45 HZO 60

Physics performance studies for the CBM-TRD at SIS100 energies — •Etienne Bechtel — IKF, Germany, Frankfurt

The CBM experiment will access a wide range of physics observables. The addition of the TRD is necessary for several of them, since this detector provides important electron and hadron identification capabilities. The pion suppression of the TRD, which is especially crucial in the momentum region above 1 GeV/c, will be used to look for thermal radiation from the early stages of the fireball with a sufficient signal to background ratio. This feature of the TRD is also very important for the measurement of the J/ψ,because due to it's high mass, the J/ψ predominantly decays into dielectrons in the higher momentum region, where the TRD is primarily providing the parti- cle identification. Additionally, the dE/dx information of the four TRD layers together with the mass measurement of the TOF-detector enables the separation of light nuclei with a good resolution. This will in particular be important for the hypernuclei program of CBM.

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HK 31.4 Mi 15:00 HZO 60

Measurement of Neutral Pions in pp Collisions at $\sqrt{s} = 5.02$ TeV with the ALICE DCal — •Adrian Mechler for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment at the CERN LHC investigates the properties of the quark-gluon plasma (QGP) which is believed to be produced in Pb–Pb collisions at high collision energies. Hadron production measurements in pp collisions provide information about the underlying QCD processes and fragmentation functions. Furthermore, pp results provide an important baseline for heavy-ion collisions.

The talk focuses on a measurement of neutral pions (π^0) which are reconstructed via their two-photon decay. The ALICE calorimeters are used to measure the position and energy of the decay photons. To enlarge the acceptance coverage of the calorimeters in ALICE with respect to LHC-RUN1 the di-jet Calorimeter (DCal) has been added for the current RUN2 data taking.

We will present the status of the first analysis of the π^0 production in pp collisions at $\sqrt{s}$=5.02 TeV, measured with the DCal. Main analysis steps such as the extraction and various corrections of the π^0 yield will be discussed. Supported by BMBF and the Helmholtz Association.

HK 31.5 Mi 15:15 HZO 60

Dielectron production in pp collisions at $\sqrt{s}$=13 TeV measured in a dedicated low magnetic-field setting with ALICE — •Jerome Jung for the ALICE-Collaboration — Goethe Universität, IKF, Frankfurt am Main, Deutschland

Low-mass dielectrons are an important probe for the hot and dense medium which is created in ultra-relativistic heavy-ion collisions. Since leptons do not interact strongly and are produced throughout the whole collision process, they carry information from all collision stages with negligible final-state interaction.

The ALICE detector is well-suited to perform this measurement due to its excellent tracking and particle identification capabilities at low momenta. However, Dalitz decays and photon conversions lead to a high combinatorial background. Therefore, the minimization of the background is a key aspect of this analysis. The reconstruction efficiency of low-p_{T} electrons can be increased by reducing the magnetic field of the central barrel solenoid. This allows a better rejection of the electron background and simultaneously gives the opportunity to increase the accessible phase space.

In this talk, the status of the dielectron measurement in pp collisions at $\sqrt{s}$ = 13 TeV from pilot runs taken with B=0.2 T in the ALICE central barrel will be presented. The results will be compared to reference data recorded with the nominal field. Finally, the invariant-mass and pair-transverse-momentum distributions will be compared to the expected yield from known hadronic sources.
Supported by BMBF and the Helmholtz Association.

HK 31.6 Mi 15:30 HZO 60

Measurement of low-mass dielectrons in minimum-bias and high-multiplicity pp collisions at 13 TeV with ALICE — •Ivan Vorobyev for the ALICE-Collaboration — Technische Universität München, Excellence Cluster Universe

Electron-positron pairs are a unique experimental tool to investigate the hot and dense medium created in ultra-relativistic heavy-ion collisions. Such pairs are produced during all stages of the collision and do not interact strongly. Therefore, they carry information about the medium properties and the whole space-time evolution of the system.

The studies of dielectron production in minimum-bias proton-proton collisions provide an important vacuum reference for any modifications observed in heavy-ion collisions. The measurement of dielectron pairs from semi-leptonic decays of correlated heavy-flavour hadrons allow further studies of the primordial heavy-flavour production. Recent studies of proton-proton collisions with high charged-particle multiplicities showed interesting results similar to the observations previously done in heavy-ion collisions. Measurements of low-mass dielectrons could provide further insight into the underlying physics processes.

In this talk we present the current status of the dielectron analysis with ALICE central barrel in pp collisions at 13 TeV. A particular focus of the discussion is put on the modification of dielectron spectrum in pp collisions collected with a trigger on high charged-particle multiplicities compared to the minimum-bias events.

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