HK 7: Schwerionenkollisionen und QCD Phasen

Zeit: Montag 14:00–16:00 Raum: P 5

Gruppenbericht HK 7.1 Mo 14:00 P 5

Dilepton production at SIS energies with the GiBUU transport model — •Janus Weil and Ulrich Mosel — Institut für Theoretische Physik, Universität Giessen, Germany

We investigate dilepton production at SIS energies with the GiBUU transport code in a resonance model approach. In a first step, we fix the model input via dilepton spectra from elementary NN collisions (measured recently by the HADES collaboration) as well as other elementary data, paying special attention to meson production via baryon resonances (which is most important for the ρ). Subsequently, we investigate additional effects of the nuclear medium in pA and AA reactions, from collisional broadening and meson absorption to a possible in-medium mass-shift of the vector mesons. Work supported by HGS-HIRe and BMBF.

HK 7.2 Mo 14:30 P 5

The role of the ρ meson in the HADES dilepton mass spectra — •Claudia Behnke[1], Tetyana Galatyuk[1,2], and Joachim Stroth[1,3] — [1]Goethe-Universität, Frankfurt — [2]ExtreMe Matter Institute EMMI, Darmstadt — [3]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

Photons and lepton pairs emerging from decays of virtual photons are the most promising probes for studying dense hadronic matter. In the energy domain of 1 - 2 GeV per nucleon, HADES has measured electron pairs in C+C, Ar+KCl, p+p, d+p and p+Nb collisions. For the first time, the electron pairs from quasi free n+p sub-reactions were reconstructed by detecting the proton spectator from the deuteron breakup. An experimentally constrained N+N reference spectrum was established. Moreover, for the first time at this energy the inclusive production cross sections of light vector mesons were extracted. These results allow for putting tight constraints on vector meson production in heavy-ion collisions at beam energies of few GeV per nucleon. In this contribution, we compare the HADES data to predictions from UrQMD microscopic transport model calculations and introduce an approach which allows to separate in a transparent way the generation of the event background from the emission pattern of physics observables under consideration.
This work has been supported by BMBF (06 FY 9100 I), HIC for FAIR, EMMI and GSI.

HK 7.3 Mo 14:45 P 5

Dielectron production in pp collisions at 7 TeV with ALICE — •Markus Konrad Köhler für die ALICE-Kollaboration — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Planckstr.1

Low-mass dielectrons are a unique probe for the hot and dense medium which can be created in ultrarelativistic heavy-ion collisions. Since leptons do not interact strongly, they carry the information from all collision stages to the detector with negligible final-state interaction. Potential modifications of the medium, like phase transitions, could have measurable impact on the characteristics of dielectrons, where pp collisions can be used as reference for a medium-free environment.
In the ALICE experiment at the LHC, electrons can be identified at mid-rapidity in the central barrel due to their specific energy loss (ITS and TPC), transition radiation (TRD), and time-of-flight (TOF).
In this contribution the status of the low-mass dielectron analysis is presented for pp collisions at $\sqrt{s}$ =7 TeV.

HK 7.4 Mo 15:00 P 5

Production of Low Mass Dielectrons in Pb-Pb collisions at ALICE — •Christoph Baumann — Goethe-Universität Frankfurt

The measurement of low mass dielectrons allows to probe all stages of ultra-relativistic collision because electrons do not undergo strong interactions. Thus the search for thermal signatures of a hot and dense medium created in heavy-ion collisions at LHC becomes possible. We will present the status of such measurements in Pb-Pb collisions with ALICE at $\sqrt{s_{\rm NN}}$ = 2.76 TeV and discuss possible thermal signatures, especially the search for an enhanced production of virtual photons.

HK 7.5 Mo 15:15 P 5

Magnetic field studies for the measurement of dielectrons with ALICE — •Ole Hinrichs for the ALICE-Collaboration — Institut für Kernphysik, Universität Frankfurt, Germany

The study of dielectrons is an important tool for obtaining information from all phases of ultra-relativistic collisions as they do not undergo strong interactions. The major obstacles in the measurement of dielectrons are the relatively small signal and large combinatorial background, such that one needs a large acceptance and a good particle identification at low transverse momentum. The latter two aspects can be improved by lowering the magnetic field in the central barrel of the ALICE detector from the nominal value of B=0.5T.
We present detailed studies with two different types of simulation to understand and quantify the effect of a reduced magnetic field. First, the full chain of simulation was used: pp collisions were generated with the event generator PYTHIA6 and propagated in a detailed simulation of the ALICE setup with GEANT3. Finally, the particles were reconstructed with the ALICE tracking software within AliRoot. As this procedure requires a huge amount of CPU-time a large number of events were produced with fast simulations. These are based on a parametrization of particle spectra and detector responses. The results of these simulations will be presented and confronted with available data.

HK 7.6 Mo 15:30 P 5

Measurement of the Nuclear Modification Factor of Electrons from Semileptonic Heavy Flavor Decays in PbPb Collisions with ALICE at the LHC — •Martin Völkl for the ALICE-Collaboration — Physikalisches Institut Heidelberg, Heidelberg, Germany

Heavy quarks are important probes of the QCD medium produced via heavy ion collisions as the medium-induced parton energy loss depends on the mass and its color-charge. Charm and beauty quarks are for the most part created early in the collision and thus traverse much of the hadronic matter. In 2010 and 2011, pp collisions at $\sqrt{s}$ = 7 TeV and PbPb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV have been recorded by ALICE at the LHC. By subtracting the measured spectra of electrons from other sources, the spectrum of electrons from heavy flavor decays may be obtained. To gain an insight into the contribution from charm and beauty quarks individually, a cut on the impact parameter of the electrons can be used to preferentially select electrons from the decays of hadrons containing beauty quarks due to their high mass and large proper decay length ($c\tau \approx 500\mu$m). We present the preliminary results of the nuclear modification factor for electrons from heavy flavor decays and the current status of the analysis of the beauty contribution to it.

HK 7.7 Mo 15:45 P 5

Measurement of B meson production in pp collisions at $\sqrt{s}$ = 7 TeV via displaced electrons in ALICE — •Markus Heide for the ALICE-Collaboration — WWU Münster

The measurement of the production cross-section of B mesons in pp collisions in ALICE is important in two respects. First it allows to test perturbative quantum chromodynamics calculations. Secondly it provides an essential reference for studies in heavy-ion collisions at high energies, in which a hot and dense medium, the quark-gluon plasma (QGP), is created. When passing through this medium, quarks lose energy via the strong interaction. Since the amount of energy loss depends significantly on the quark mass, beauty as the heaviest observable flavour is of particular interest for the exploration of QGP properties.

A promising method for obtaining the B meson yield is the analysis of electrons from its semileptonic decay channels, whose methods and results will be presented in this talk. First, the electron identification using ALICE's Time Projection Chamber (TPC) and Time Of Flight (TOF) detector will be outlined. Then it will be explained how we make use of the B mesons' larger decay length ($\sim$ 500 μm) in comparison to D mesons and other background sources by selecting electrons with a large impact parameter. The method for estimation of the remaining background electrons in the selected sample will be presented, which is based on calculations using ALICE measured p_t spectra of π^0 and D mesons. As a result, the B meson spectrum measured in pp collisions at $\sqrt{s}$ = 7 TeV in 2010 will be shown.