HK 5: Physik mit schweren Ionen

Zeit: Montag 18:00–19:15 Raum: F

HK 5.1 Mo 18:00 F

Reconstruction of π^0 with CERES — •Rachik Soualah for the CERES Collaboration — Physikalisches Institut, Universität Heidelberg, Germany

Direct photons are a suitable probe to search for evidence of quark-gluon plasma formation in ultrarelativistic heavy-ion collisions. Direct photons are very difficult to measure experimentally due to the large background from π^0 and η meson decays. The WA98 experiment at SPS has reported a significant yield of direct photons. The main systematic error comes from the yield of η mesons, measured only poorly at SPS energies. In addition, the main source of systematic errors in the measurement of the dilepton pairs in the low mass range, main physics topic of the CERES experiment comes from the η/π^0 ratio.
CERES can measure the photons that convert shortly before the TPC by measuring the e^+e^- pairs in the TPC. In this contribution, the method to measure photons will be explained. The status of the π^0 analysis and the feasibility studies of η meson reconstruction will be presented.

HK 5.2 Mo 18:15 F

Hadron Suppression and Nuclear k_T Enhancement studied with neutral pions from p+C, p+Pb, and Pb+Pb Collisions at $\sqrt{s_{NN}}$ = 17.2 GeV — •Markus Rammler, Christoph Baumann, and Klaus Reygers — Institut für Kernphysik,48149 Münster,Nordrhein-Westfalen – for the WA98 Collaboration

A comprehensive understanding of jet-quenching in heavy-ion collisions requires the study of its energy dependence. Jet-quenching models are able to describe the high-p_T hadron suppression at RHIC energies whereas the amount of jet-quenching at CERN SPS energies remains an open question. The WA98 collaboration has published neutral-pion spectra for Pb+Pb collisions at $\sqrt{s_{NN}} = 17.2\,\text{GeV}$ [1]. However, in addition to the Pb+Pb measurement the study of a possible pion suppression at the CERN SPS requires a reference spectrum measured at the same energy and a good understanding of the nuclear k_T effect (*Cronin enhancement*). Therefore, neutral-pion spectra in p+C and p+Pb collisions at $\sqrt{s_{NN}} = 17.2\,\text{GeV}$ will be presented in this talk. The neutral-pion spectrum in p+C provides a useful reference for the Pb data measured in the same experiment. The nuclear k_T enhancement can be studied by comparing neutral-pion production in p+C and p+Pb.

[1] WA98 Collaboration, Eur.Phys.J.C 23, 225-236, 2002

HK 5.3 Mo 18:30 F

High-pT neutral pion and direct photon measurements in STAR — •Andre Mischke — (for the STAR collaboration) Institute for Subatomic Physics, Utrecht University, The Netherlands

The strong suppression of high-pT hadron yields and azimuthal correlations measured in central Au+Au collisions at the Relativistic Heavy Ion Collider reveals strong evidence for significant final state parton energy loss in the hot, dense medium produced in the collisions. Direct photons are a very clean probe since they leave the medium without additional interactions and therefore allow studying the earliest stages of the collision. Direct photon production in p+p interaction is a precision test of perturbative QCD and it can be used in d+Au collisions to study initial state effects in the gold nucleus. Both are essential to interpret results in Au+Au collisions at RHIC.

The STAR electro-magnetic calorimeter has very good high-pT capabilities due to its large acceptance coverage at mid-rapidity (0<eta<1 and full azimuth) combined with the very good tracking and collision vertex determination capabilities of the TPC. Neutral pions are the main source of decay photons and have to be measured with high precision.

We will present the current status of neutral pion and direct photon measurements at high-pT in STAR. The measurements will be compared to perturbative QCD calculations.

HK 5.4 Mo 18:45 F

Photon production from an anisotropic quark-gluon plasma — •Björn Schenke[1] and michael Strickland[2] — [1]Institut für Theoretische Physik, Johann Wolfgang Goethe - Universität, Max-von-Laue-Straße 1, D-60438 Frankfurt am Main — [2]Frankfurt Institute for Advanced Studies, Johann Wolfgang Goethe - Universität, Max-von-Laue-Straße 1, D-60438 Frankfurt am Main

We calculate photon production from a quark-gluon plasma which is anisotropic in momentum space including the Compton scattering and quark/anti-quark annihilation processes. We show that for a quark-gluon plasma which has an oblate momentum-space anisotropy the photon production rate has an angular dependence which is peaked transverse to the beam line. We propose to use the angular dependence of high-energy medium photon production to experimentally determine the degree of momentum-space isotropy of a quark-gluon plasma produced in relativistic heavy-ion collisions.

HK 5.5 Mo 19:00 F

Recent Results on high-p_T Physics from PHENIX — •Christoph Baumann for the PHENIX-Collaboration — Institut für Kernphysik, Münster, Germany

RHIC results show a strong suppression signal of neutral meson and charged hadron yields at high transverse momentum in central Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV compared to a binary scaled p+p reference. In Cu+Cu collisions at the same energy a suppression similar in strength to that in Au+Au collisions for an equal number of participants, has also been observed. This suppression has been attributed to the energy loss of partons in the hot and dense matter created in the collision, but the exact mechanism, which causes the suppression is still under investigation.
PHENIX has measured spectra of π^0, η, and non-identified charged hadrons in various collision systems and at different energies. These measurements can provide important information for understanding the suppression mechanism at play. A new 62.4 GeV p+p data set complements the existing Au+Au and Cu+Cu measurements and serves as a crucial baseline for understanding particle production in Au+Au and Cu+Cu collisions at the same energy. In addition, data at 22.4 GeV have been analyzed to allow a systematic study of the energy and collision species dependence over a broad range, including a comparison with CERN SPS results. Additional information of the energy loss mechanism can be derived from two and three particle jet-correlations. We will present the latest results on these measurements.