HK 23: Schwerionenkollisionen und QCD Phasen III

Zeit: Dienstag 16:30–19:00 Raum: HG I

Gruppenbericht HK 23.1 Di 16:30 HG I

ALICE TRD-Detektor — •Dariusz Miśkowiec für die ALICE-TRD-Kollaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt — ExtreMe Matter Institute EMMI, Darmstadt

ALICE ist dasjenige der vier großen Experimente am CERN LHC, das speziell zur Untersuchung von Kollisionen von Bleikernen konzipiert wurde. Der grossflächige Übergangsstrahlungsdetektor TRD des ALICE Experimentes verbessert die Impulsauflösung im zentralen Akzeptanzbereich und erlaubt eine Elektronenidentifizierung bei hohen Transversalimpulsen. Über diese Elektronen bekommt man Zugang zu semileptonisch zerfallenden Hadronen mit Charm- und Bottomquarks. Zur Messung dieser seltenen Teilchen ist ein vom TRD abgeleiteter Elektronentrigger von wesentlicher Bedeutung.

Sieben der insgesamt achtzehn Supermodule des TRD sind bereits in ALICE installiert. Die Module wurden 2008 und 2009 in Betrieb genommen und mit kosmischer Strahlung kalibriert. Als im November 2009 der LHC erste Protonenstrahlen lieferte, konnte der Detektor erfolgreich eingesetzt werden.

In dem Vortrag wird eine kurze, auch für Außenstehende verständliche, Übersicht des ALICE TRD Detektors gegeben und die mit der Messung der kosmischen Strahlung gewonnenen Erfahrungen dargestellt. Die bei den Protonenkollisionen aufgenommenen Daten werden selbstverständlich im Mittelpunkt der Präsentation stehen.

HK 23.2 Di 17:00 HG I

Femtoscopic two-particle correlation measurements with the ALICE experiment at the LHC — Sebastian Huber[1], •Jorge Mercado[2], and Dariusz Miśkowiec[1] for the ALICE-TRD-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt. — [2]Physikalisches Institut der Universität Heidelberg, 69120 Heidelberg.

Femtoscopy is unique among all analysis techniques utilized in subatomic collision experiments as it directly addresses the space-time structure of the evolving system at the femto scale.

ALICE (A Large Ion Collider Experiment) is the experiment at the CERN Large Hadron Collider (LHC) dedicated to study high-energy nuclear collisions that will also exploit the proton–proton physics program with wide phase-space coverage and good resolution. We present the first femtoscopic analysis of two-particle correlations in $p+p$ collisions at $\sqrt{s}$ = 900 GeV, measured with ALICE during its commissioning run in December 2009. Preliminary source dimensions are estimated from two-particle correlation functions, $C(Q_{\mathrm{inv}})$, constructed using these measurements.

HK 23.3 Di 17:15 HG I

Correlation between mean transverse momentum and multiplicity in p-p collisions at 900 GeV in ALICE — •Philipp Lüttig for the ALICE-Collaboration — Institut für Kernphysik, Goethe Universität, Frankfurt am Main

The correlation between the mean transverse momentum $< p_t >$ and the charged particle multiplicity is an important constraint for phenomenological models describing p-p collisions at high energies. The Time Projection Chamber of the ALICE experiment at LHC is capable to measure charged particle multiplicities and transverse momenta above $p_t = 150$ MeV/c. In this presentation we discuss the strategy to extract $< p_t >$ from the particle spectra and present the status of an analysis of p-p collisions at 900 GeV measured with the ALICE TPC during the first physics campaign at LHC.

HK 23.4 Di 17:30 HG I

The performance of the ALICE Transition Radiation Detector with the first beams at LHC — •Ionut Cristian Arsene[1], Markus Fasel[2], and Andreas Köhler[2] for the ALICE-TRD-Collaboration — [1]ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt — [2]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

ALICE is one of the four large experiments at the LHC and is dedicated to the study of heavy ion collisions at relativistic energies. The Transition Radiation Detector(TRD) is one of the detectors with large acceptance coverage in ALICE. Its aim is to provide very good electron-pion separation at momenta above 1 GeV/c as well as to deliver a Level-1 trigger on electrons for the study of rare probes. We will discuss in detail the performance of the TRD detector during the first campaign of data taking at LHC at the energy of $\sqrt{s}$=0.9 TeV. Emphasis will be placed on the monitoring of the stability of various operational parameters of the detector and of the results of the off-line reconstruction of the TRD data.

HK 23.5 Di 17:45 HG I

Perspectives of J/ψ measurements in the ALICE experiment at the CERN LHC — •WooJin Park[1], Anton Andronic[1], Ionut Cristian Arsene[1], Frederick Kramer[2], Dirk Krumbhorn[3], and Jens Wiechula[3] for the ALICE-Collaboration — [1]GSI, Darmstadt, Germany — [2]University of Frankfurt, Frankfurt, Germany — [3]University of Heidelberg, Heidelberg, Germany

Quarkonia are key observables to probe the deconfined matter produced in heavy ion collisions at the CERN LHC in an unprecedented regime of high initial energy densities. Quarkonia measurements in p+p collisions are crucial for testing theoretical models and to provide a reference for Pb+Pb collisions.

We report on a study of the $J/\psi \rightarrow e^+e^-$ measurement in the central barrel of ALICE detector. This measurement relies on the excellent tracking and particle identification capabilities of the Time Projection Chamber and the Transition Radiation Detector in ALICE. The performance of the J/ψ reconstruction is evaluated based on simulated events including a detailed description of the full ALICE detector systems. We estimate the efficiency of J/ψ detection as well as the signal to background ratio. An optimization of the analysis cuts based on efficiency and background contribution is carefully examined. Finally, our expectations for the first year of data taking are presented.

An important capability of the TRD is to provide a Level-1 trigger on high-momentum electrons, allowing for an excellent measurement of J/ψ at high transverse momenta as well as of ψ' and the Upsilon family. We will show first estimates of the performance of such a trigger.

HK 23.6 Di 18:00 HG I

Reconstruction of open charm hadrons with the ALICE experiment at the LHC — •Rosa Romita[1,3,4], Benjamin Doenigus[1,5], and Robert Grajcarek[2] for the ALICE-Collaboration — [1]GSI, Darmstadt, Germany — [2]Heidelberg Universität, Heidelberg, Germany — [3]FIAS, Darmstadt, Germany — [4]EMMI, Darmstadt, Germany — [5]H-QM, Darmstadt, Germany

ALICE is the dedicated LHC experiment to the identification and characterization the quark gluon plasma (QGP) in high-energy nuclear collisions at the LHC. Due to their large mass and their exclusive generation at the early collision stage, heavy quarks (charm and bottom) are ideal probes for the properties of the QGP. It is still an open question whether the baryon over meson enhancement at intermediate momentum as observed at RHIC also holds for the heavy-quark sector. The experimental signature of open charm is a secondary decay vertex displaced from the collision vertex measured with sub-millimeter precision. We report on the expected performance of ALICE in reconstructing open charm mesons, i.e. D^0, D^+, D_s, in various decay channels and collision systems from detailed Monte Carlo simulations. Furthermore, we present latest results on a feasibility study on reconstructing the charmed baryon decay channels $\Lambda_c^+ \rightarrow \pi^+ + K^- + p$, $\Lambda_c^+ \rightarrow \Lambda + \pi^+$, and $\Lambda_c^+ \rightarrow K_S^0 + \pi^+$. If data becomes available, we will present first calibration results concerning reconstructed secondary decay vertices from p+p collisions at $\sqrt{s}$ = 900 GeV.

HK 23.7 Di 18:15 HG I

Construction and Calibration Status of the ALICE TRD — •Henriette Gatz, Björn Albrecht, and Matthias Walter for the ALICE-TRD-Collaboration — Westfälische Willhelms-Universität Münster

The Transition Radiation Detector (TRD) is part of the ALICE experiment at CERN, designed for particle identification, tracking and triggering. In the current LHC run, 7 of the 18 super-modules that comprise the TRD are installed. The remaining 11 are being assembled and tested at the University of Münster. As part of the quality assurance, several million cosmic events are recorded. Based on these data a first determination of calibration parameters is possible: e.g.

the detector gain can be determined with a granularity of 4 pads, the misalignment of the TRD chambers with respect to the ideal position can be calculated and provided for the offline reconstruction. To evaluate the TRD trigger performance the position and angular resolution as well as the efficiency of the tracklet reconstruction implemented in the front end electronics are studied with these cosmic data as well as with Monte Carlo simulations.

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HK 23.8 Di 18:30 HG I

Two-Particle Jet-Like Correlations in the ALICE Experiment at the LHC — •Jason Glyndwr Ulery for the ALICE-TRD-Collaboration — Institut für Kernphysik - Goethe-Universität, Frankfurt, Germany

The Large Hadron Collider will be able to collide protons at energies up to $\sqrt{s} = 14$ TeV and lead ions at energies up to $\sqrt{s_{NN}} = 5.5$ TeV. One way to study these collisions is through jet-like correlations. In *pp* collisions, these correlations provide information about the fragmentation of a high momentum parton into a jet of hadrons. This can be compared to calculations and event simulators, such as PYTHIA and PHOJET, because high momentum partons are calculable in perturbative Quantum Chromodynamics and can be fragmented according to models, such as the Lund String Model. One may also study whether the assumed underlying event, likely composed of particles from non-perturbative soft processes, is truly uncorrelated from the jet. In heavy-ion collisions, the jet is used as a probe of the medium created in these collisions. The medium is expected be a Quark-Gluon Plasma, a deconfined state of quarks in gluons. With measurements in *pp* collisions and calculations/simulations, jets are a well calibrated probe. These correlations can be used to study how energy is lost in the medium and the interactions of the medium and the jet. I will present the status of an analysis of 2-particle jet-like correlations of charged particles measured in the ALICE Time Projection Chamber and discuss the physics results that can be obtained from this analysis.

HK 23.9 Di 18:45 HG I

Transverse momentum spectra of charged particles measured with ALICE in pp collisions — •Jacek Otwinowski for the ALICE-TPC-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Planckstraße 1, 64291 Darmstadt, GERMANY

ALICE is one of four experiment at the LHC which is capable to measure transverse momenta of charged particles with an excellent resolution.

The transverse momentum spectra of charged particles measured with ALICE in pp collisions will be presented. Comparison with existing measurements and with MC models including PYTHIA and PHOJET will be discussed.