HK 64: Schwerionenkollisionen und QCD Phasen VIII

Time: Friday 14:00–16:00 Location: HS1

Group Report HK 64.1 Fri 14:00 HS1

Measurement of the J/ψ Production Cross Section in pp Collisions at $\sqrt{s}$ = 7 TeV with ALICE at the LHC and Perspectives for PbPb Collisions — •Frederick Kramer[1], Ionut Arsene[2], Christoph Blume[3], Julian Book[1], Anton Andronic[2], WooJin J. Park[2], and Jens Wiechula[4] for the ALICE-Collaboration — [1]University of Frankfurt — [2]GSI Darmstadt — [3]University of Heidelberg — [4]University of Tübingen

ALICE is the dedicated heavy-ion physics experiment at the Large Hadron Collider (LHC). It is designed to provide excellent capabilities to study the Quark-Gluon Plasma (QGP), the deconfined state of strongly-interacting matter, in the highest energy density regime opened up by the LHC. Quarkonia, bound states of heavy (charm or bottom) quarks such as the J/ψ, are crucial probes of the QGP. An essential baseline for measurements in AA collisions is high-precision data from pp collisions. Moreover, measurements in pp in the new energy domain of the LHC serve as a crucial test for competing models of quarkonium hadroproduction.

We will present first results of rapidity and transverse momentum distributions of the inclusive J/ψ production cross section. The analysis is based on the reconstruction of the channel $J/\psi \to e^+e^-$ using the central barrel detectors of ALICE. Furthermore, the status of the corresponding analysis in PbPb collisions will be given.

Group Report HK 64.2 Fri 14:30 HS1

Electrons from heavy flavour decays with the ALICE experiment in proton-proton collisions at $\sqrt{s}$= 7TeV — •Raphaelle Bailhache for the ALICE-Collaboration — Institut für Kernphysik, Universität Frankfurt, Germany

Measurements of charm ($c\bar{c}$) and bottom ($b\bar{b}$) production in proton-proton (pp) collisions serve as an important baseline for studies in heavy-ion collisions and allow to test pQCD calculations. Next-to-leading order calculations have still a factor two uncertainty at the energies reached by the Large Hadron Collider (LHC). The heavy quark production cross-sections can be measured by identifying single leptons from semi-leptonic heavy flavor hadron decays. In 2010, pp collisions at $\sqrt{s}$=7 TeV have been recorded by ALICE at the LHC at CERN. In this talk we will focus on the measurement of an inclusive electron p_T spectrum in pp collisions at 7 TeV with the central barrel of ALICE. Electrons are identified using the Time Projection Chamber and the Time Of Flight Detector. The fully corrected electron spectrum is presented and compared to a cocktail of electrons from known hadronic decays and photon conversions to extract the contributions of open-charm and open-beauty hadron decays. Perspectives for future measurement including the Transition Radiation Detector and the Electro-Magnetic Calorimeter will be discussed.

HK 64.3 Fri 15:00 HS1

Messung des Wirkungsquerschnitts von Hadronen mit schweren Quarks in Proton-Proton Kollisionen mit dem ALICE Experiment — •Fasel Markus — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Planckstraße 1, 64291 Darmstadt

Die Messung der Produktion von Charm und Bottom Quarks in Proton-Proton Kollisionen ist ein guter Test für perturbative QCD. Außerdem dient die Messung als Referenz für die Untersuchung von Charm und Beauty Produktion in Schwerionenkollisionen. Das ALICE Experiment ist aufgrund seiner Fähigkeiten zur Teilchenidentifikation und Stoßparameterbestimmung für die Messung des Wirkungsquerschnittes von Hadronen mit schweren Quarks bestens geeignet. Dieser kann sowohl über semileptonische als auch über hadronische Zerfallskanäle gemessen werden. Wir geben einen Überblick über entsprechende Messungen mit dem ALICE Experiment in Proton-Proton Kollisionen bei $\sqrt{s} = 7TeV$ und geben einen Vergleich mit theoretischen Vorhersagen.

HK 64.4 Fri 15:15 HS1

Messung der Produktion schwerer Quarks in Pb+Pb Kollisionen mit dem ALICE Detektorsystem — •Yvonne Pachmayer für die ALICE-Kollaboration — Physikalisches Institut der Universität Heidelberg

Charm- und Bottom-Quarks können wegen ihrer großen Massen $m \gg \Lambda_{QCD}$ nur in primären harten Partonstößen und während der frühen Phase des Quark-Gluon-Plasmas (QGP) produziert werden. Daher stellen schwere Quarks eine ideale Sonde für die Untersuchung des QGPs dar, das für kurze Zeit in ultra-relativistischen Schwerionenkollisionen erzeugt werden kann. Vor allem der Energieverlust der schweren Quarks in diesem Medium ist von besonderem Interesse.
Im November 2010 erzeugte der Large Hadron Collider (LHC) am CERN erstmals Pb+Pb Kollisionen bei einer Schwerpunktsenergie von $\sqrt{s_{NN}}$ = 2,76 TeV. In diesem Vortrag wird vorgestellt, wie Elektronen aus dem Zerfall von Hadronen, die schwere Quarks (Charm/Bottom) in sich tragen, mit dem ALICE Detektor am LHC identifiziert werden können. Zum Teilchennachweis werden die Zeit-Projektionskammer, der Übergangsstrahlungsdetektor, das Kalorimeter sowie der Flugzeitdetektor verwendet. Jeder Detektor muß zunächst kalibriert werden und verstanden sein, vor allem im Hinblick auf die hohen Multiplizitäten geladener Teilchen in diesen Pb+Pb Kollisionen. Es wird über erste Erfahrungen und Zwischenergebnisse berichtet.

HK 64.5 Fri 15:30 HS1

Reconstruction of open charm in the decay channel $D^0 \to K^-\pi^+$ with ALICE — •Robert Grajcarek for the ALICE-Collaboration — Physikalisches Institut der Universität Heidelberg

A Large Ion Collider Experiment (ALICE) at the Large Hadron Collider (LHC) has been built in order to identify and characterize the quark gluon plasma (QGP) in high-energy nuclear collisions. As charm quarks are produced at the early stage of the collision, they serve as ideal probes for a QGP. In proton-proton collisions at the unprecedented high center-of-mass energy of $\sqrt{s}$ = 7 TeV charm production rates and their comparison to theory predictions are of utmost interest. The ALICE detector with its powerful capabilities such as particle identification, vertexing at sub-millimeter precision and tracking in a high multiplicity environment addresses the charm sector both in proton-proton and nuclear collisions. We report on preliminary results on open charm production via open charm meson decays, i.e. $D^0 \to K^-\pi^+$ in proton-proton collisions using a secondary vertex finding procedure based on the Kalman filter. This algorithm, which is performed after reconstructing the trajectories of single particles, provides access to topological cut variables and the reduced χ^2 of the full decay topology. If data becomes available we will present first results on open charm reconstruction of $D^0 \to K^-\pi^+$ in Pb+Pb collisions at $\sqrt{S_{NN}}$ = 2.76 TeV.

HK 64.6 Fri 15:45 HS1

Open charm production in the $D^{*+} \to D^0\pi^+$ decay channel with ALICE — •Yifei Wang for the ALICE-Collaboration — Physikalisches Institut, Uni Heidelberg

Heavy quarks(c, b), due to their large mass, are unique tools to study the degree of thermalization of the initially created QCD medium in high-energy nuclear collisions at LHC. Further, the calculation of the total charm production cross section remains a challenge in perturbative QCD.
LHC has been successfully delivering p+p collisions at the world's highest center of mass energy of $\sqrt{s}$ = 7 TeV in year 2010. The ALICE detector with its full azimuthal coverage at mid-rapidity and pointing resolution of 50μm at the collision vertex, is able to identify most of open charm hadrons down to lowest momenta. We present preliminary results on the spectrum of open charm production channel of $D^{*+} \to D^0\pi^+$ (BR:68%), where $D^0 \to K\pi^+$ (BR: 4%), and give a comparison to predictions from theory.
Depending on the progress of analysis, we will show first result on Pb+Pb data @$\sqrt{s_{NN}}$ = 2.76 TeV.