

## HK 48: Heavy Ion Collision and QCD Phases X

Zeit: Donnerstag 14:00–16:00

Raum: S1/01 A01

**Gruppenbericht**

HK 48.1 Do 14:00 S1/01 A01

**Charged-particle production in Pb-Pb collisions at the LHC measured with ALICE** — ●FEDERICA SOZZI for the ALICE-Collaboration — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

In June 2015 data taking started at the LHC at CERN, with substantially increased collision rates and energies with respect to Run 1. Particle production at collider energies originates from the interplay of perturbative (hard) and non-perturbative (soft) QCD processes. Inclusive charged-particle production in pp collisions has been studied with the new data set collected by the ALICE experiment at  $\sqrt{s} = 13\text{TeV}$ . In this report the pseudorapidity distributions of primary charged particles are presented, as well as the transverse-momentum distribution and its evolution with the event multiplicity. In Pb-Pb measurements the investigation focuses on the deconfined quark-gluon state. The transverse-momentum spectrum measured in Pb-Pb collisions is compared with a pp minimum-bias reference spectrum measured at the same energy. The comparison is presented here in terms of the so called nuclear modification factor  $R_{AA}$  measured at  $\sqrt{s_{NN}} = 5\text{TeV}$ , the highest collision energy ever achieved in laboratory. The measurements in pp and Pb-Pb collisions are compared with results from Run 1 as well as with predictions from theoretical models.

HK 48.2 Do 14:30 S1/01 A01

**Centrality dependence of charged-particle multiplicity at  $\sqrt{s_{NN}}=5.02\text{ TeV}$  Pb-Pb collisions measured by ALICE at LHC** — ●TATIANA DROZHKOVA<sup>1,2</sup> and ALBERICA TOIA<sup>1,2</sup> for the ALICE-Collaboration — <sup>1</sup>Goethe-Universität, Frankfurt am Main — <sup>2</sup>GSI, Darmstadt

The multiplicity of produced particles is an important property of the collisions related to the initial energy density and collision geometry. Its dependence on the collision centrality is sensitive to the interplay between particle production from hard and soft processes and coherence effects between individual nucleon-nucleon scatterings. The Large Hadron Collider (LHC) now operates at a higher energy producing Pb-Pb collisions at a center-of-mass energy per nucleon pair of 5.02 TeV. Our work is concentrated on the centrality estimation and the study of the performance of centrality selection using different detector systems in ALICE. We have developed a new framework which allows a dynamic definition of the centrality estimators and allows to perform a run-by-run calibration in a more robust way. We present the centrality dependence of particle production in Pb-Pb collisions at  $\sqrt{s_{NN}}=5.02\text{ TeV}$  measured by the ALICE experiment with a special emphasis on the event classification in centrality classes and its implications in the interpretation of the nuclear effects. Supported by Helmholtz Graduate School for Hadron and Ion Research (HGS-HIRE).

HK 48.3 Do 14:45 S1/01 A01

**Transverse momentum distributions of charged-particles in pp collisions with ALICE at the LHC** — ●EDGAR PEREZ LEZAMA for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt — Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

The charged-particle transverse momentum spectrum is an important observable for understanding quantum chromodynamics (QCD), theory of strong interactions in proton-proton collisions. In 2015 pp collisions at  $\sqrt{s} = 13\text{TeV}$  and  $\sqrt{s} = 5\text{TeV}$  were recorded using the ALICE detector at the LHC. The measurement of inclusive production of charged-particles in high-energy proton-proton collisions and its evolution with the event multiplicity is a key observable to characterize the global properties of the collision. With the increase in collision energy, the role of hard processes (parton scatterings with large momentum transfer) in final state particle production rapidly increases and offers the possibility to further constrain particle production models. The reach of the maximum beam energy of the Large Hadron Collider (LHC) allows the study of pp collisions over a wide range of centre-of-mass energy, and specifically the measurement of charged-particle spectrum at 5 TeV plays a key role in the construction of the nuclear modification factor ( $R_{AA}$ ). In the talk transverse momentum distributions measured with ALICE at a collision energy of  $\sqrt{s} = 13\text{ TeV}$  and  $\sqrt{s} = 5\text{ TeV}$  in pp collisions will be presented. Results will be compared

to models and to the previous ALICE measurements at other energies.

HK 48.4 Do 15:00 S1/01 A01

**Measurement of jet fragmentation into charged particles in p-Pb collisions at  $\sqrt{s_{NN}} = 5.02\text{ TeV}$  with ALICE** — ●DENNIS WEISER for the ALICE-Collaboration — Physikalisches Institut, Heidelberg, Deutschland

The measurement of jet energy loss or jet properties in ultrarelativistic Pb-Pb collisions allows to access the properties of the Quark-Gluon Plasma. Specifically, measurements of jet fragmentation are sensitive to possible modifications of the parton radiation pattern and thus give insights into the energy loss mechanisms in the hot and dense medium.

The measurement of jet fragmentation in p-Pb collisions provides an important reference to the measurement in Pb-Pb collisions. To assign possible modifications observed in Pb-Pb collisions to in-medium effects a measurement in a reference system is needed in that the medium is not created, but where possible initial-state- or cold-nuclear-matter effects are present.

We present the measurement of the longitudinal momentum distribution of charged particles with transverse momentum  $p_T > 0.15\text{ GeV}/c$  in charged jets in p-Pb collisions at  $\sqrt{s_{NN}} = 5.02\text{ TeV}$ . Charged jets are reconstructed with the anti- $k_T$  algorithm with a radius parameter of  $R=0.4$ . The underlying event is subtracted event-by-event as well as on the event ensemble level. The observed distributions are compared to a reference based on pp collisions.

HK 48.5 Do 15:15 S1/01 A01

**Measurement of Identified Charged Hadrons in Charged Jets from Proton-Lead Collisions with ALICE at the LHC** — ●MARTIN SCHMIDT for the ALICE-Collaboration — Physikalisches Institut, Universität Tübingen

The spectra of identified hadrons in jets offer possibilities to investigate the fragmentation of partons in detail. By comparing the results for proton-proton (pp) and proton-lead (p-Pb) we can test hypotheses about cold nuclear matter effects.

The ALICE experiment at the LHC has excellent particle identification capabilities for tracks with transverse momentum ranging from 150 MeV/c to above 20 GeV/c.

We report on the measurement of the charged hadron composition in charged jets from p-Pb collisions at  $\sqrt{s_{NN}} = 5.02\text{ TeV}$ . The jets are reconstructed from charged tracks using the anti- $k_T$  algorithm. Charged hadrons are identified via their specific energy loss  $dE/dx$  in the ALICE TPC.

We show the jet constituent spectra for different event multiplicities as functions of  $p_T^{\text{charged}}$  and  $z = p_T^{\text{track,charged}}/p_T^{\text{jet,charged}}$  and compare the results to those of pp collisions.

HK 48.6 Do 15:30 S1/01 A01

**Transverse momentum distributions of charged particles in Pb-Pb collisions with ALICE at the LHC** — ●JULIUS GRONEFELD for the ALICE-Collaboration — Research Division and ExtreMe Matter Institute, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt — Institut für Kernphysik, Technische Universität Darmstadt

ALICE is a LHC experiment dedicated to heavy ion collisions, with the aim of understanding the physics of the hot and dense medium produced in collisions of lead ions.

Since November 2015 the LHC is running close to the designed energy, delivering collision energies of  $\sqrt{s_{NN}} = 5\text{ TeV}$  per nucleon pair in the Pb-Pb collision system.

The study of inclusive charged particle production sheds light the suppression of high transverse momentum ( $p_T$ ) hadrons, due to parton energy loss in the medium. A common way to investigate this effect is the determination of the nuclear modification factor ( $R_{AA}$ ) given by the ratio between a  $p_T$ -spectrum and a pp reference spectrum scaled by the number of binary collisions.

In this talk transverse momentum distributions measured with ALICE at a collision energy of  $\sqrt{s_{NN}} = 5\text{ TeV}$  in Pb-Pb collisions will be presented. Spectra and  $R_{AA}$  will be shown in dependence on centrality. In addition the findings will be compared to current models.

HK 48.7 Do 15:45 S1/01 A01

**Performance of the CBM experiment for measurements of charged particles anisotropic flow** — ●VITALII BLINOV<sup>1,2</sup> and ILYA SELUZHENKOV<sup>2</sup> for the CBM-Collaboration — <sup>1</sup>Goethe-Universität, Frankfurt am Main — <sup>2</sup>GSI, Darmstadt

Energies of the beam provided by SIS100 at FAIR allow to reach high net baryon density that is important for the investigation of a part of the QCD matter phase diagram that is currently not well known. Anisotropic flow in heavy-ion collisions is an important observable for such investigations. Our work is concentrated on CBM performance

for anisotropic flow measurements via azimuthal correlations between charged hadrons in a heavy-ion collisions. We use collisions simulated at various energies for different colliding systems with several models. The CBM experiment response is simulated with GEANT4 Monte-Carlo. For the analysis the CBM ROOT was used as well as the Q-vector Correction Framework that allows to remove effects of the azimuthal non-uniformity of the detectors.

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