

## HK 39: Heavy Ion Collisions and QCD Phases VI

Zeit: Mittwoch 16:30–18:15

Raum: HZO 60

**Gruppenbericht**

HK 39.1 Mi 16:30 HZO 60

**$J/\psi$  production in pp and Pb-Pb collisions at mid-rapidity with ALICE** — ●RAUL TONATIUH JIMENEZ BUSTAMANTE for the ALICE-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — Physikalisches Institut, University of Heidelberg, Heidelberg, Germany

Charmonium production is a key observable in pp and Pb-Pb collisions. The charmonium study in pp collisions can help to understand both fundamental QCD processes and hadronization mechanisms.  $J/\psi$  measurements as a function of multiplicity can help to explore the soft regime.

In the study of charmonium in Pb-Pb collisions several QGP effects have been observed, such as the suppression of charmonium states due to color screening. However, an enhancement due to (re)combination of uncorrelated charm and anti-charm quarks has been observed at LHC energies. This enhancement is more pronounced at low transverse momentum ( $p_T < 4.0$  GeV/c).

ALICE provides unique capabilities among the LHC experiments to measure  $J/\psi$  production in the mid-rapidity ( $|y| < 0.9$ ) region down to  $p_T = 0$ . In this talk, ALICE measurements in pp at  $\sqrt{s} = 13$  TeV as a function of charged particle multiplicity will be shown. In addition, the inclusive  $J/\psi$  nuclear modification factor ( $R_{AA}$ ) as a function of centrality and transverse momentum will be discussed and compared to model predictions.

HK 39.2 Mi 17:00 HZO 60

**$J/\psi$  production at LHC energies with the Statistical Hadronisation Model** — ANTON ANDRONIC<sup>1</sup>, PETER BRAUN-MUNZINGER<sup>1</sup>, ●MARKUS K. KÖHLER<sup>2</sup>, and JOHANNA STACHEL<sup>2</sup> — <sup>1</sup>Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany — <sup>2</sup>Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Germany

We present recent results on inclusive  $J/\psi$  production at LHC energies within the framework of the Statistical Hadronisation Model. The centrality and rapidity dependence are demonstrated to reproduce available data at LHC energies. Input parameters from hydrodynamical simulations are used to calculate the  $J/\psi$  transverse momentum dependence.

HK 39.3 Mi 17:15 HZO 60

**Measurements of inclusive and non-prompt  $J/\psi$  production in p-Pb collisions at  $\sqrt{s_{NN}} = 8$  TeV in ALICE at the LHC** — ●MINJUNG KIM for the ALICE-Collaboration — Physikalisches Institut, Universität Heidelberg

The measurement of  $J/\psi$  production in p-Pb collisions is an important probe to study possible cold nuclear matter effects as well as final state mechanisms, which can affect its production. In ALICE (A Large Ion Collider Experiment),  $J/\psi$  production has been measured in the dielectron decay channel at mid-rapidity as well as in the dimuon decay channel at forward rapidity. In the recent data taking period (Run 2), ALICE collected an enriched sample of high- $p_T$  electron candidates using the electron trigger of the Transition Radiation Detector (TRD). In addition,  $J/\psi$  from weak decays of beauty hadrons (non-prompt  $J/\psi$ ), can be separately at mid-rapidity due to the excellent primary and secondary vertex as well as impact parameter resolution of the Inner Tracking System (ITS). In this talk, we will present the status of the inclusive and non-prompt  $J/\psi$  measurement in p-Pb collisions at  $\sqrt{s_{NN}} = 8.16$  TeV with the TRD triggered data. This work was supported by BMBF.

HK 39.4 Mi 17:30 HZO 60

**Charm measurements in heavy ion collisions by NA61/SHINE at CERN SPS** — ●ALEKSANDRA SNOCH for the NA61/SHINE-Collaboration — Goethe-University Frankfurt am Main NA61/SHINE is a fixed target experiment operating at the CERN Super-Proton-Synchrotron (SPS). The NA61/SHINE Collaboration studies properties of hadron production in nucleus-nucleus collisions. The primary aim is to uncover features of the phase transition between

confined matter and quark gluon plasma. Within the current program data on p+p, Be+Be, Ar+Sc, Xe+La, and Pb+Pb collisions at beam momenta in the range 13A-150A GeV/c has been recorded.

This program is currently extended by measurements of charm hadron production in heavy ion collisions, which requires a significant detector upgrade.

In this talk I will discuss three questions that motivate the NA61/SHINE open charm studies:

- What is the mechanism of charm production?
- How charm production is influenced by the onset of deconfinement?
- How  $J/\psi$  production is changed by the presence of quark-gluon plasma?

To answer these questions, results on total number of  $c\bar{c}$  quark pairs produced in heavy ion collisions must be provided. Foreseen accuracy of the corresponding NA61/SHINE data will be presented in reference to the physics motivation.

HK 39.5 Mi 17:45 HZO 60

**Measurement of Angular Correlations between Heavy-Flavour Electrons and Charged Particles in pp Collisions at  $\sqrt{s} = 13$  TeV with ALICE** — ●FLORIAN HERRMANN for the ALICE-Collaboration — WWU Münster, Germany

Heavy flavour quarks (charm and beauty) are of special interest for the study of the Quark-Gluon Plasma as they are predominantly produced in the initial hard-scattering processes and participate in the entire evolution of the system. Moreover, heavy flavour productions is well under control of perturbative QCD. Thus, heavy flavours are an excellent probe to study pQCD in small systems as well as parton in medium energy loss and transport mechanisms in nuclear collisions by measuring, for instance, the spectra, angular correlations or the nuclear modification factor  $R_{AA}$ . Experimentally, heavy flavours are often investigated using measurements of electrons from heavy-flavour hadron decays. These electrons can be separated statistically from the background and their angular correlations with other heavy flavour electrons or with charged particles can be studied. In this talk, we will present a current approach to measure two-particle correlations of heavy flavour electrons with charged particles biased to higher  $p_T$  ( $> 2$  GeV/c) or with the leading particle in pp collisions at  $\sqrt{s} = 13$  TeV with the ALICE experiment. Monte Carlo calculations provide promising predictions to disentangle charm and beauty contributions and different heavy-quark production mechanisms in these correlation measurements. – Supported by BMBF and DFG GRK2149.

HK 39.6 Mi 18:00 HZO 60

**Transverse momentum dependence of  $J/\psi$  production in Pb-Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV at mid-rapidity with ALICE** — ●DENNIS WEISER for the ALICE-Collaboration — Physikalisches Institut, Im Neuenheimer Feld 226, Heidelberg

ALICE at the Large Hadron Collider (LHC) provides unique capabilities to study charmonium production at low transverse momenta. In the early and hottest phase of nucleus-nucleus collisions the formation of a Quark-Gluon Plasma (QGP) is expected. Several QGP induced effects, such as the melting of charmonium states due to color screening and/or a (re)combination of uncorrelated charm and anti-charm quarks, can play a role. While a suppression of  $J/\psi$  with respect to binary-scaled pp collisions was indeed observed in heavy-ion collisions at all energies, recent measurements in Pb-Pb collisions at  $\sqrt{s_{NN}} = 2.76$  TeV indicate that (re)combination does seem to play an important role in the low  $p_T$  region at LHC energies.

At central rapidity, corresponding to the range  $|y| < 0.9$ ,  $J/\psi$  are reconstructed down to zero  $p_T$  via their decay into two electrons. We will present results on the transverse momentum dependence of inclusive  $J/\psi$  production in Pb-Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV. In particular, we will present the centrality dependence of the  $J/\psi$  average transverse momentum ( $\langle p_T \rangle$ ) and the  $p_T$  broadening ( $r_{AA} = \langle p_T^2 \rangle^{A-A} / \langle p_T^2 \rangle^{pp}$ ).