

HK 4: Heavy-Ion Collisions and QCD Phases I

Time: Monday 16:30–18:00

Location: J-HS F

Group Report

HK 4.1 Mon 16:30 J-HS F

J/ψ production measurements in pp, p-Pb and Pb-Pb collisions at midrapidity with ALICE at the LHC — ●YVONNE PACHMAYER for the ALICE-Collaboration — Physikalisches Institut der Universität Heidelberg

J/ψ production is a powerful tool to study the properties of the quark-gluon plasma, since its production is strongly affected by the dense and hot medium created in heavy-ion collisions. In nucleus-nucleus interactions at LHC energies, the charmonium states reveal a smaller suppression with respect to the one measured at lower energies. This is a clear sign of a (re)combination process affecting quarkonium production, which is also confirmed by the measurement of a significant elliptic flow, suggesting a strong participation of the charm quarks in the collectivity of the medium. pp collisions serve not only as an important reference, but also allow quarkonium production models to be constrained and multi-parton interactions to be studied. The influence of cold-nuclear-matter effects is studied in p-Pb collisions.

At midrapidity, the ALICE experiment allows J/ψ production to be measured in the dielectron decay channel down to zero transverse momentum and the prompt and non-prompt contributions to be separated. Further, the electron trigger provided by the Transition Radiation Detector in pp and p-Pb collisions allows the measurements to be extended to intermediate and high transverse momenta.

The large wealth of precise data from the ALICE experiment, recently published and new results from pp, p-Pb and Pb-Pb collisions, will be presented, with comparisons with state-of-the-art theoretical models.

HK 4.2 Mon 17:00 J-HS F

Studies on Midrapidity J/ψ Production as a Function of Charged-Particle Multiplicity in different regions of the azimuthal angle with ALICE — ●AILEC DE LA CARIDAD BELL HECHAVARRIA for the ALICE-Collaboration — Westfaelische Wilhelms-Universitaet Muenster. Institut fuer Theoretische Physik

The study of the J/ψ meson in correlation with the charged-particle multiplicity is a key observable for the separation of the hard and soft scales, governing, respectively, the production and hadronization of the $c\bar{c}$ pair. Experimentally ALICE studies have shown a stronger than linear relative increase of the inclusive J/ψ production at midrapidity as a function of the charged-particle multiplicity in proton-proton collisions. To shed light on the causes for this behavior Monte Carlo simulations were performed with PYTHIA 8 and the studies attributed part of this behavior to autocorrelation effects. In this regard, interesting results were obtained studying the correlation of the J/ψ production with the charged-particle multiplicity in different regions of the azimuthal angle with respect to the flight direction of the J/ψ meson. With data collected at the LHC with ALICE experiment on proton-proton collisions at $\sqrt{s}=13$ TeV, current results at midrapidity ($|y|<0.9$) of the J/ψ in correlation with the charged-particle multiplicity in three defined regions of the azimuthal angle (toward, transverse and away) will be shown and compared to predictions from the PYTHIA 8 Monte Carlo generator.

HK 4.3 Mon 17:15 J-HS F

Measurements of J/ψ production in p-Pb collisions at $\sqrt{s_{NN}} = 8.16$ TeV with ALICE — ●MINJUNG KIM for the ALICE-Collaboration — Physikalisches Institut, Universität Heidelberg

Measurements of J/ψ production in p-Pb collisions are a valuable probe to study cold nuclear matter effects as well as final state mechanisms, which can affect its production.

In ALICE (A Large Ion Collider Experiment), J/ψ production is measured at midrapidity via the dielectron decay channel down to zero transverse momentum (p_T). The contribution of J/ψ from weak decays of beauty hadrons (non-prompt J/ψ) is separately measured based on the long life time of beauty hadrons.

In this presentation, we will show measurements of inclusive and non-prompt J/ψ production in p-Pb collisions at $\sqrt{s_{NN}} = 8.16$ TeV. Results from minimum bias collisions as well as from an high- p_T electron enriched data sample collected using the Transition Radiation Detector (TRD) will be discussed.

HK 4.4 Mon 17:30 J-HS F

Nuclear modification factor of inclusive J/ψ measured with ALICE at midrapidity in Pb-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV — ●ALENA GROMADA for the ALICE-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung, Planckstr. 1, Darmstadt — Physikalisches Institut, Heidelberg University, Im Neuenheimer Feld 226, Heidelberg

Heavy quarks are produced during hard scatterings at the early stage of nucleus-nucleus collisions. Therefore, the J/ψ meson, a bound state of a charm quark and its antiquark, serves as important probe of Quark-Gluon Plasma (QGP) properties. An in-medium modification can be studied via the nuclear modification factor R_{AA} expressing the difference between yields measured in heavy-ion collisions and the J/ψ cross section in pp collisions multiplied by the nuclear overlap function. A strong J/ψ suppression was observed at SPS and RHIC energies in most central collisions. At the LHC, the suppression is reduced compared to these measurements at lower energies due to the (re)generation of J/ψ from the deconfined medium. However, it is not yet well understood whether this (re)generation process takes place during the QGP phase and/or at hadronization.

A high statistics data sample of central and semi-central Pb-Pb collisions was recorded by ALICE in 2018. In this talk, R_{AA} at midrapidity will be presented as a function of centrality and transverse momentum. The measurement will be compared with previous ALICE results and with model calculations.

HK 4.5 Mon 17:45 J-HS F

Blast-wave description of Upsilon elliptic flow at LHC energies — KLAUS REYGERS¹, ALEXANDER SCHMAH¹, ●ANASTASIA BERDNIKOVA², and XU SUN³ — ¹Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany — ²National Research Nuclear University MEPhI, Moscow, Russian Federation — ³Georgia State University, Atlanta, Georgia 30303, USA

A simultaneous blast-wave fit to particle yields and elliptic flow (v_2) measured as a function of transverse momentum in Pb-Pb collisions at LHC energies is presented. A compact formula for the calculation of $v_2(p_T)$ for an elliptic freeze-out surface is used which follows from the Cooper-Frye ansatz without further assumptions. Over the full available p_T range, the Υ elliptic flow data is described by the prediction based on the fit to lighter particles. This prediction shows that, due to the large Υ mass, a sizable elliptic flow is only expected at transverse momenta above 10 GeV/c.