HK 17: Heavy-Ion Collisions and QCD Phases IV

Time: Tuesday 17:00–18:30 Location: SCH/A315

Group Report HK 17.1 Tue 17:00 SCH/A315

Hydrodynamic modeling of J/ψ p_{T} spectra and anisotropic flow in the Statistical Hadronization Model — Anton Andronic[3], Peter Braun-Munzinger[1,2], •Hjalmar Brunssen[1], Jana Crkovská[1], Johanna Stachel[1], and Martin Völkl[1] — [1]Physikalisches Institut, Universität Heidelberg — [2]ExtreMe Matter Institute EMMI, GSI — [3]Institut für Kernphysik, WWU Münster

The Statistical Hadronization Model (SHM) has been shown to describe the observed particle yields in heavy-ion collisions very successfully. This is true not only for hadrons consisting of light-flavor valence quarks, but also for those containing charm quarks with the corresponding enhancement when one incorporates in the SHM that charm quarks are produced in initial hard collisions.

In this talk, we present the calculation of the transverse momentum spectra and anisotropic flow coefficients of the J/ψ. The assumption underlying the statistical hadronization of charm quarks is that they thermalize in the medium. This is supported by experimental evidence that they participate in the collective expansion. In order to come from a yield predicted by the SHM to the p_{T}-dependent anisotropic flow coefficients and transverse momentum spectra, the evolution of the quark gluon plasma (QGP) needs to be modeled by a hydrodynamic simulation. For the QGP evolution and the freeze-out, results from three different viscous hydrodynamic models are presented: 2+1D and 3+1D MUSIC as well as FluiduM. The results of these three approaches are compared to recent ALICE data.

HK 17.2 Tue 17:30 SCH/A315

Prompt and non-prompt J/ψ production as a function of multiplicity in pp collisions with ALICE — •Gauthier Legras for the ALICE Germany-Collaboration — Institut für Kernphysik, WWU Münster

J/ψ production involves a hard scale for the creation of the charm-anticharm pair, and a soft scale for its hadronization. Correlating it with the multiplicity, mainly determined by soft particle production processes, in small systems allows to investigate the interplay between hard and soft scales. However, a substantial part of the J/ψ, called non-prompt J/ψ, comes from the decay of open-beauty hadrons. Since open-beauty hadron production mechanism is different from the one for prompt J/ψ, it becomes necessary to disentangle the prompt contribution from the non-prompt one in order to know if the non-prompt fraction could impact the inclusive (prompt + non-prompt) distribution of J/ψ as a function of multiplicity.

This study aims at determining the fraction of non-prompt J/ψ as a function of multiplicity in pp collisions at $\sqrt{s} = 13$ TeV, through its decay of J/ψ to an electron-positron pair at midrapidity. The fraction is determined from the study of displaced J/ψ decay vertices, using a Boosted Decision Tree algorithm for the identification of the J/ψ and its classification.

HK 17.3 Tue 17:45 SCH/A315

Statistical hadronization model for Au-Au collisions at SIS18 energies — •Szymon Harabasz[1], Jedrzej Kolas[2], Radoslaw Ryblewski[3], Wojciech Florkowski[4], Tetyana Galatyuk[5,1], Malgorzata Gumberidze[5], Piotr Salabura[4], Joachim Stroth[5,6], and Hanna Paulina Zbroszczyk[2] — [1]TU Darmstadt — [2]Warsaw University of Technology — [3]Institute of Nuclear Physics PAS — [4]Jagiellonian University in Krakow — [5]GSI Helmholtzzentrum für Schwerionenforschung GmbH — [6]Institut für Kernphysik, GU Frankfurt

We show that the transverse-mass and rapidity spectra of p and $\pi^{\pm}$ produced in Au-Au collisions at $\sqrt{s_{\mathrm{NN}}} = 2.4$ GeV can be well reproduced in a thermal model of particle emission from a spheroid single freeze-out hypersurface. This scenario extends the one used by Siemens and Rasmussen in the original formulation of the blast-wave model by allowing for elongation or contraction of the source. We incorporate a Hubble-like expansion of QCD matter and resonance decays.

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HK 17.4 Tue 18:00 SCH/A315

Studies on J/ψ production as a function of the charged-particle multiplicity in pp collisions at the LHC — •Ailec de la Caridad Bell Hechavarria for the ALICE Germany-Collaboration — Institut für Kernphysik, Westfälische Wilhelms- Universität Münster

The inclusive J/ψ yields as a function of the charged-particle multiplicity exhibit a stronger than linear increase when the J/ψ is measured at midrapidity (|y|<0.9) than when it is measured at forward rapidity (2.5 <|y|< 4). Insight into this effect could be gained by using the J/ψ as a leading particle and studying the associated underlying events in the collision.

Data collected in pp collisions with ALICE at the LHC during Run 2 is used to investigate the relative J/ψ yield, measured at mid-rapidity (|y|<0.9) in its dielectron decay channel and as a function of the charged-particle multiplicity, in various regions of the azimuthal angle with respect to the emission of the J/ψ meson. This contribution will show these measurements in pp collisions at $\sqrt{s}$=13 TeV.

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HK 17.5 Tue 18:15 SCH/A315

Mid-Rapidity J/ψ production as a function of multiplicity at different rapidities in p–Pb collisions at the LHC with ALICE — •Tabea Eder for the ALICE Germany-Collaboration — Institut für Kernphysik, Westfälische Wilhelms- Universität Münster

ALICE results from Run 1 data on the charged-particle multiplicity dependence of the inclusive normalized J/ψ production, both at mid-rapidity, indicate a stronger than linear increase for proton-lead collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV.

To better understand the multiplicity dependent J/ψ production and possible contributions from auto-correlation effects, the J/ψ production at mid-rapidity is studied as a function of multiplicity in different rapidity ranges. This can be done in ALICE using the V0A and V0C detectors for the multiplicity estimation, which are situated at different rapidities at either side of the collision point.

In this talk the inclusive J/ψ production at mid-rapidity will be shown as a function of multiplicity at different rapidity ranges for proton-lead collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV using ALICE Run 2 data. In addition studies of J/ψ production in ANGANTYR, the heavy-ion machinery of PYTHIA8, will be shown.

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