

## HK 36: Heavy-Ion Collisions and QCD Phases VIII

Time: Wednesday 14:00–15:30

Location: HK-H2

**Group Report**

HK 36.1 Wed 14:00 HK-H2

**Charged pion emission from central heavy-ion collisions measured with HADES** — ●MARVIN NABROTH for the HADES-Collaboration — Goethe-Universität Frankfurt, Frankfurt, Germany

Relativistic heavy-ion collisions provide an experimental tool to generate strongly interacting matter that exhibits extreme densities and high temperatures. With the HADES (High-Acceptance-Dielectron-Spectrometer) experiment the emission of several particle species including di-leptons, originated from a heavy-ion collisions are probed at SIS18 energies at a few GeV. Pions are, due their low mass, the most abundantly emitted mesons. Especially, charged pions can be easily detected by magnet-spectrometry. The resulting high statistics allow to precisely determine their production multiplicities as function of participants, to investigate the condition at the kinematic freeze-out as well as to examine anisotropies in the collective emission behaviour. The fact that the charged pion's spectra are experimentally covered still with high abundance at low transverse momenta makes them a suitable probe for the investigation in regard of the Coulomb effect. Within the scope of this talk, we will discuss the recent published results on charged pions from Au+Au collisions at  $\sqrt{s_{NN}} = 2.4$  GeV as well as the ongoing analysis regarding charged pions from Ag+Ag collisions at  $\sqrt{s_{NN}} = 2.55$  GeV. Covered are the measured production rates, the results on directed, elliptic and triangular anisotropic flow and the determination of the Coulomb potential. This work has been supported by BMBF (05P19RFFCA), GSI and HIC for FAIR.

HK 36.2 Wed 14:30 HK-H2

**Charged-particle production in pp collisions at  $\sqrt{s} = 900$  GeV with LHC Run 3 ALICE data** — ●PETER STRATMANN for the ALICE-Collaboration — Westfälische Wilhelms-Universität Münster, Germany

The ALICE experiment at the Large Hadron Collider (LHC) is designed to investigate properties of the quark-gluon plasma (QGP) created in high-energy heavy-ion collisions. Medium effects can be investigated by comparing to the charged-particle production in pp collisions, where no QGP is expected. In the upcoming LHC Run 3, the ALICE collaboration prepares to collect Pb–Pb data at unprecedented peak-collision rates of about 50 kHz. To accomplish this, the main tracking detectors underwent fundamental upgrades and a brand new reconstruction and analysis framework was developed.

In this talk, we present one of the first measurements performed with these new detectors and software. We investigate the bulk particle production in pp collisions at  $\sqrt{s} = 900$  GeV observed in data taken during a five day pilot beam in the end of October 2021. We discuss the tracking performance and show the correlation of  $p_T$  spectra with multiplicity for inclusive charged particles obtained with a 2d unfolding procedure that was already used in a comprehensive analysis of Run 1 and Run 2 data. These first results are compared to minimum bias spectra of inclusive charged particles at the same energy, which were among the first measurements when ALICE started taking data.

Supported by BMBF within the ERuM framework and the Helmholtz Association.

HK 36.3 Wed 14:45 HK-H2

**Light (anti-)nuclei production in Pb-Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV measured with ALICE** — ●MALAVIKA PANIKKASSERY SALVAN for the ALICE-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt — Technische Universität Darmstadt

The production mechanism of light (anti-)nuclei in heavy-ion collisions is not yet fully understood and is under debate in the scientific community. Two prominent phenomenological models typically used to describe the experimental data are: the statistical hadronization model (SHM) which assumes that all hadrons are emitted from a thermal source in local thermal and hadrochemical equilibrium, and the coalescence model where the baryons close to each other in phase space form a nucleus at the kinetic freeze-out.

The ratio of integrated yields of (anti-)deuterons to (anti-)protons in heavy-ion collisions is sensitive to the production mechanism as the two models predict different trends.

In this contribution, the deuteron-to-proton yield ratio measured in central (0-10%) Pb-Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV with ALICE is presented and the results are discussed in the context of the two phenomenological models.

HK 36.4 Wed 15:00 HK-H2

**Charged-particle  $p_T$  spectra as a function of multiplicity in pp, p-A and A-A collisions measured with ALICE** — ●YOUSSEF EL MARD BOUZIANI for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE experiment focuses on the study of the hot and deconfined QCD medium, the Quark-Gluon Plasma (QGP), by investigating heavy-ion collisions at ultra-relativistic energies. Particle production in different collision systems can be examined by means of the correlation between charged-particle transverse momentum ( $p_T$ ) spectra and the event multiplicity.

In this talk, a differential analysis of charged-particle  $p_T$  spectra as a function of charged-particle multiplicity density is presented. The spectra are obtained by means of a 2-dimensional unfolding procedure. The energy and system-size dependence of charged-particle production is inspected studying the correlation of  $p_T$  and charged multiplicity in different collision systems and center-of-mass energies. In particular, resulting spectra measured in pp, p-Pb, Pb-Pb and Xe-Xe collisions are considered. Comparisons of the measurements to predictions from Monte-Carlo event generators are reported.

Supported by BMBF and the Helmholtz Association.

HK 36.5 Wed 15:15 HK-H2

**Study of the production mechanism of light nuclei in small systems at the LHC with ALICE** — ●LUCA BARIOGLIO<sup>1</sup> and MICHAEL HABIB<sup>2,3</sup> for the ALICE-Collaboration — <sup>1</sup>Technische Universität München, Garching bei München, Deutschland — <sup>2</sup>GSI, Darmstadt, Deutschland — <sup>3</sup>Technische Universität Darmstadt, Darmstadt, Deutschland

At the LHC, an abundant production of light (anti)nuclei is observed in all collision systems and at all energies. However, their production mechanism is still under debate in the scientific community. The ALICE Collaboration has recently published the measurement of the production of (anti)deuteron and (anti)helion in pp collisions at  $\sqrt{s} = 5$  TeV and at  $\sqrt{s} = 13$  TeV.

In this presentation, the measurement of the coalescence parameter  $B_A$ , both as a function of transverse momentum and as a function of multiplicity, and the measurement of the yield-ratios of nuclei and protons as a function of multiplicity will be shown. In particular,  $B_A$  as a function of the transverse momentum is, for the first time, compared with theoretical predictions which take into account both the nuclear wave function and the dependence on the size of the emitting source.