HK 56: Heavy-Ion Collisions and QCD Phases XI

Time: Thursday 14:00–15:30 Location: HK-H1

Group Report HK 56.1 Thu 14:00 HK-H1

ALICE 3 – A Next-Generation Heavy-Ion Experiment — •Sebastian Scheid for the ALICE-Collaboration — Goethe University, Frankfurt, Germany

In this contribution we will present ALICE 3, a detector proposed for the next-generation heavy-ion program in LHC Run 5 and 6. The innovative detector concept, will give access to novel measurements of electromagnetic and hadronic probes of the QGP at very low momenta that will remain inaccessible in LHC Run 3 and 4. This includes the multi-differential measurement of thermal dileptons, that provide insight on the early phases of the medium formation. The measurement of multi charm states and exotic objects in the heavy flavour sector, as well as the correlation of heavy-flavour hadrons can be used to gain information on the hadronisation and strong interaction processes.

To achieve these measurements the detector has to provide tracking and particle identification down to lowest transverse momenta with an unprecedented pointing resolution while keeping the material budget to a minimum.

HK 56.2 Thu 14:30 HK-H1

Production of non-prompt Λ_c^+ in pp collisions at $\sqrt{s} = 13$ TeV with ALICE — •Daniel Battistini for the ALICE-Collaboration — Università degli Studi di Torino, Turin, Italy

In proton-proton (pp) collisions, the production of heavy-flavour (HF) hadrons is typically described as a convolution of the parton distribution functions of the colliding protons, the partonic cross section, and the Fragmentation Functions (FFs). The latter describes the hadronisation of the heavy quarks in the different hadron species, and, since this process is non-perturbative, it is usually parametrised from measurements in e^+e^- collisions. However, recent studies by the ALICE Collaboration show that the ratio between the production of charm baryons with respect to mesons is significantly higher in hadronic collisions compared to e^+e^- interactions, invalidating the assumption that the FFs are independent of the collision system.

This contribution presents an extension of the studies on HF-baryon production in hadronic collisions to the beauty sector, via the measurement of the transverse-momentum-differential production cross section of Λ_c^+-baryon originating from beauty-hadron decays in pp collisions at $\sqrt{s} = 13$ TeV. The measurement will also be compared to theoretical predictions based on fixed order plus next to the leading logarithm pQCD calculations folded with the beauty-hadron to Λ_c^+ decay kinematics from PYTHIA8 simulations.

HK 56.3 Thu 14:45 HK-H1

CBM performance for the measurement of strange hyperons' anisotropic flow in Au+Au collisions at FAIR SIS-100 energies — •Oleksii Lubynets[1,2] and Ilya Selyuzhenkov[1,3] for the CBM-Collaboration — [1]GSI, Darmstadt, Germany — [2]Goethe Universität Frankfurt, Germany — [3]NRNU MEPhI, Moscow, Russia

The main goal of the CBM experiment is to study highly compressed baryonic matter produced in collisions of heavy ions. The SIS-100 accelerator at FAIR will enable investigation of the QCD matter at temperatures up to about 120 MeV and net baryon densities 5-6 times the normal nuclear density. Hyperons produced during the dense phase of a heavy-ion collision provide information about the equation of state of the QCD matter. The measurement of (multi)strange hyperons' anisotropic flow is important for understanding the dynamics and evolution of the QCD matter created in the collision.

We will present the status of performance studies for strange hyperons anisotropic flow measurement for the CBM experiment at FAIR. Strange hyperons decay within the CBM detector volume and are reconstructed via their decay topology. The Particle-Finder Simple package, which provides an interface to the Kalman Filter Particle mathematics, is used to reconstruct decay kinematics and to optimize criteria for strange hyperons candidates selection. Anisotropic flow of strange hyperons is studied as a function of rapidity, transverse momentum and collision centrality. The effects due to non-uniformity of the CBM detector response in the azimuthal angle, transverse momentum and rapidity are corrected using the QnTools analysis package.

HK 56.4 Thu 15:00 HK-H1

Σ^0 reconstruction in Ag+Ag collisions at $\sqrt{s_{NN}} = 2.55$ GeV with HADES — •Marten Becker for the HADES-Collaboration — Justus-Liebig-University Giessen

HADES investigates the moderate temperature and high density regime of the QCD phase diagram. Strangeness can give a direct insight into the created dense matter, in particular close to the nucleon nucleon production threshold. In 2019 HADES collected Ag+Ag collisions at 2.55 GeV center of mass energy. A newly installed electromagnetic calorimeter allows for photon detection. Furthermore the RICH detector was upgraded, which strongly improves electron identification and the detection of conversion-pairs. In this contribution preliminary results on the search for the Σ^0 baryon, decaying electromagnetically into $\Lambda + \gamma$ will be presented. Detailed simulations prove the feasibility of this measurement using photon detection in the electromagnetic calorimeter or by employing photon conversion method based on the reconstruction of low momentum electrons in the RICH. Using the photon detected in the electromagnetic calorimeter an estimate of the Λ/Σ^0 ratio will be extracted.

HK 56.5 Thu 15:15 HK-H1

K_S^0 and Λ production in and outside jets in pp collisions at 13 TeV — •Lucia Anna Tarasovičová — Westfälis- che Wilhelms-Universität Münster, Germany

The contribution of jet fragmentation and soft processes to the strange hadron production in small collisions is still not understood well. Thus, angular correlations between particles can be utilised to study soft and hard fragmentation and production processes as well as the role of multiple parton interactions. Moreover, a study of the multiplicity dependence can further differentiate between the connection of bulk-particle and strangeness production in a more dense environment and the potential role of collective effects. In this talk, we present results on the two-particle correlation studies with respect to a primary charged hadron with high-p_{T} (3-20 GeV/c) in pp collisions at 13 TeV measured with ALICE. The production of associated K_S^0 mesons, Λ hyperons and primary charged hadrons in jets and out of jets is studied as a function of the transverse momentum of the trigger and associated particles for several event-multiplicity classes. The yields will be compared among different associated particles and compared with PYTHIA and EPOS LHC event generators.