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Exploring the hadron gas phase of relativistic heavy-ion collisions with ALICE (remote)

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Hadronic resonances have typical lifetimes that are comparable to that of the hadron gas phase created in the late stages of high-energy nuclear collisions. Therefore, a significant fraction of resonances decays inside a high-density medium and their decay daughters may rescatter with other hadrons destroying their initial kinematic correlations. A competing effect is resonance regeneration via pseudo-elastic interactions of hadrons. The interplay between these effects, which may modify the measured yields and transverse-momentum spectra of hadronic resonances, can be studied by measuring the yield ratio of resonances to the corresponding long-lived particle as a function of the hadronic lifetime, i.e. charged-particle multiplicity. In addition, measurements of the differential yields of resonances with different masses, quark content, and quantum numbers help in understanding particle production mechanisms, strangeness production, and parton energy loss.

In this presentation, recent measurements of hadronic resonances in Pb–Pb and Xe–Xe collisions as a function of multiplicity will be presented. Collisions between Xe nuclei provide the ultimate test for validating the picture of the smooth evolution of hadronic rescattering across different collision systems by filling the gap between p–Pb and Pb–Pb multiplicities. Furthermore, the measured resonance yields in Xe–Xe and Pb–Pb collisions are used as an experimental input in a partial chemical equilibrium-based thermal model to constrain the kinetic freeze-out temperature. This is a novel procedure that is independent of assumptions on the flow velocity profile and the freeze-out hypersurface.

Category

Experiment

Collaboration (if applicable)

ALICE

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