

Mesonic strange resonances in p+p collisions at SPS energies

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The NA61/SHINE experimental physics program focuses on searching for the critical point and studying the properties of the onset of deconfinement in the strongly interacting matter. A two-dimensional scan is performed by varying the beam momentum (from 13A to 150/158A GeV/c) and the system size (from p+p to Pb+Pb) of the collided nuclei. This contribution presents results on $K^*(892)^0$ and $\phi(1020)$ meson production in proton-proton collisions, the smallest system in the scan, at beam momenta of 40 and 80 GeV/c, and most detailed ever experimental data at 158 GeV/c.

The analysis of short-lived resonances may allow understanding the less-known aspects of high energy collisions, especially their time evolution. The yields of resonances may help to distinguish between two possible freeze-out scenarios: sudden and gradual. In particular, the ratio of K^*/K production allows estimating the time interval between chemical (end of inelastic collisions) and kinetic (end of elastic collisions) freeze-outs.

Strangeness production enhancement in large systems compared to small ones is traditionally considered as a signal of quark-gluon plasma formation. To discuss the nature of the enhancement it is important to compare this effect in both the open and hidden strangeness sector which is done in this contribution. The comparison of $\phi(1020)$ meson production in p+p and Pb + Pb collisions shows also a non-trivial system size dependence of the longitudinal evolution of hidden strangeness production, contrasting with that of other mesons.

In detail, this talk will include the measurements of rapidity, transverse momentum, and transverse mass spectra of $K^*(892)^0$ and $\phi(1020)$, which will be compared to model predictions (such as EPOS, Pythia, and UrQMD). The multiplicity of studied hadrons and the ratio of $\langle K^*(892)^0 \rangle / \langle K^\pm \rangle$ and $\langle \phi \rangle / \langle \pi \rangle$ as a function of system size and energy are planned to be presented together with the results from other experiments. For $K^*(892)^0$, the results will also include the measured mass and width of $K^*(892)^0$ as a function of transverse momentum. For $\phi(1020)$, the width of rapidity distribution will be presented based on the NA61/SHINE p+p data and the world data on nucleus-nucleus collisions.

Present via

Online

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