Centrality Dependence of Multistrange Baryon Production in High-Energy Heavy-Ion Collisions

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Aim:

The multistrange baryons and antibaryons are a valuable probe in understanding the particle production mechanism in high energy collisions.

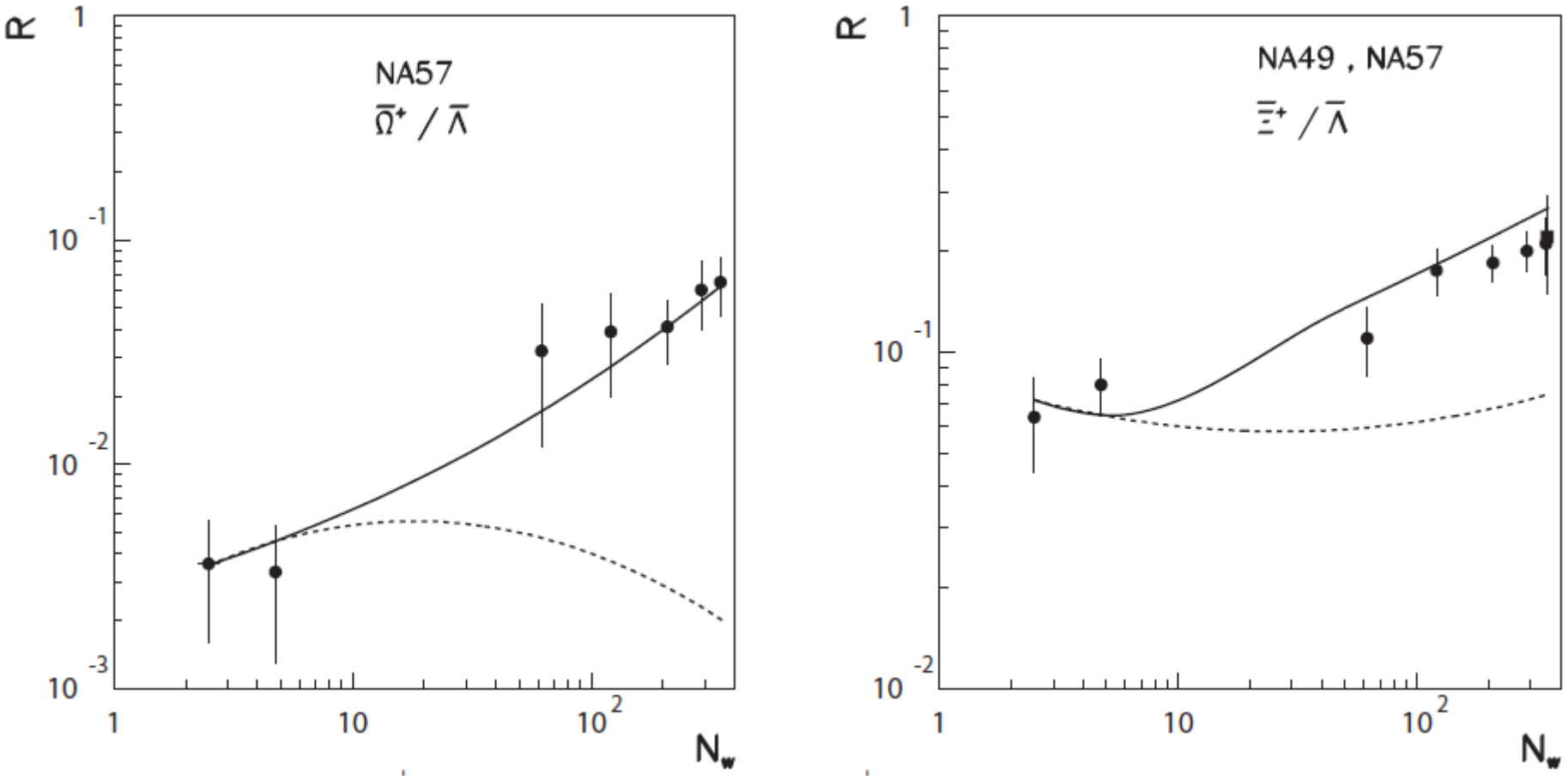
We compare the experimental ratios of multistrange to strange antibaryon production on nuclear targets at the energy region from SPS to LHC, with the corresponding results obtained in the frame of the Quark-Gluon String Model (QGSM).

The QGSM is based on Dual Topological Unitarization, Regge phenomenology, and nonperturbative features of QCD, ad it successfully describes multiparticle production in hadron-hadron and hadron-nucleus collisions.

A remarkable feature of strangeness production is that the production of each additional *s* quark featuring in the secondary baryons, is affected by one universal strangeness suppression factor, λ_s:

$$\lambda_s = \frac{B(qqs)}{B(qqq)} = \frac{B(qss)}{B(qqs)} = \frac{B(sss)}{B(qss)},$$

together with some simple quark combinatorics (B's are production yields).



The ratios $\bar{\Omega}^+/\bar{\Lambda}$ (left panel) and $\bar{\Xi}^+/\bar{\Lambda}$ (right panel) as functions of the number of wounded nucleons, N_ω. The experimental data for *Pb+Pb* collisions for different values of N_ω (different centralities), measured by the NA57 Collaboration (points), and by the NA49 Collaboration (squares), are presented, and compared with the corresponding QGSM predictions.

Conclusions

By comparing the QGSM predictions for strange and multistrange production in hadronic and nuclear collisions at high energies, we observe the following effect in the experimental data:

The experimental dependence on centrality of the ratios $\bar{\Omega}^+/\bar{\Lambda}$ and $\bar{\Xi}^+/\bar{\Lambda}$, in nuclear collisions at SPS energies, shows the dependence of the strangeness suppression factor, λ_s, on centrality.

On the contrary, the strangeness suppression parameter λ_s is constant for pp and light-nuclei collisions.

This effect, observed for heavy-ion collisions at SPS energies, disappears at very high (RHIC and LHC) energies.