

# Baryon dynamics at RHIC and the role of strong color fields

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We have investigated Au+Au collisions at RHIC and the effects of strong color fields (SCF), associated with an enhanced strangeness and diquark production probability and with an effective decrease of formation times, on the antibaryon-to-baryon ratios and netbaryon distributions. A transport model based on string, (di)quark, and hadron (resonance) degrees of freedom has been used (UrQMD). At high energies the number and density of strings grows, so that they start overlapping, forming clusters, which act as new effective sources for particle production. Strange particle and baryon pair production are strongly enhanced (according to the Schwinger mechanism) and collision numbers increase (due to smaller formation times). The ratios increase with the color field strength and with the strangeness content  $|S|$  (Fig. 1). The dependence of the  $\bar{B}/B$ -ratios on  $\kappa$  is, a priori, not directly transparent. On the one hand, an increased pair production drives the ratio towards 1. On the other hand, reduced formation times and, hence, stronger baryon transport, reduce the ratios. The netbaryon number at midrapidity considerably increases with the color field strength while the netproton number remains roughly the same (Fig. 2). The maxima of the rapidity distributions are shifted toward midrapidity in the SCF case. The enhanced baryon transport involves a conversion into the hyperon sector (*hyperonization*) which can be observed in the  $(\Lambda - \bar{\Lambda})/(p - \bar{p})$  ratio.

## References

- [1] S. Soff, J. Randrup, H. Stöcker, N. Xu, Phys. Lett. **B551**, 115-120 (2003), LBNL-51006.
- [2] S. Soff, contribution to the Proceedings of the RIKEN BNL Research Center Workshop on Baryon Dynamics, Mar 2002, Brookhaven National Lab., Upton, NY.

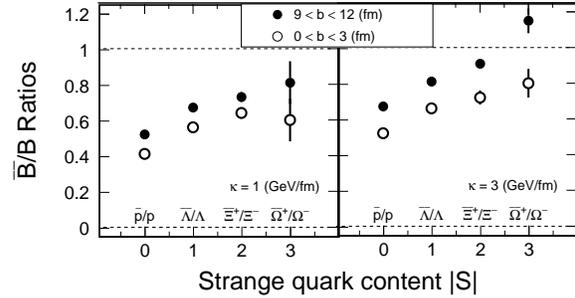


Figure 1: Antibaryon-to-baryon ratios at midrapidity as a function of the strangeness content  $|S|$  in Au+Au collisions at RHIC ( $\sqrt{s_{NN}} = 200$  GeV). Calculations with a string tension of  $\kappa = 1$  GeV/fm are shown on the left and the results with strong color fields ( $\kappa = 3$  GeV/fm) are shown on the right.

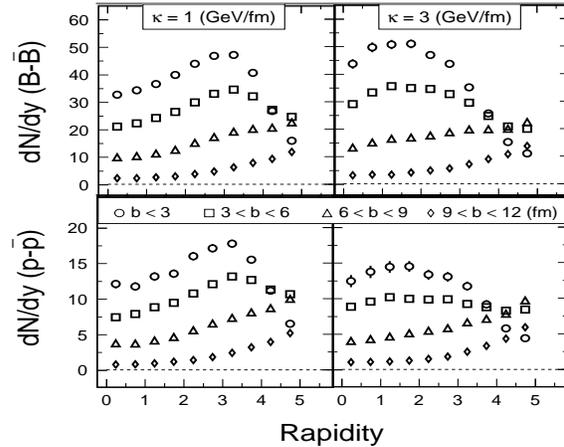


Figure 2: Rapidity distributions for netbaryons (top) and netprotons (bottom) in Au+Au collisions at RHIC ( $\sqrt{s_{NN}} = 200$  GeV). Calculations with a standard string tension ( $\kappa = 1$  GeV/fm) are shown on the left and the results with strong color fields ( $\kappa = 3$  GeV/fm) are shown on the right. The symbols correspond to different centralities.