Mid-rapidity anti-proton to proton ratio from Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 130$ GeV*

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Baryon number transport (or stopping), achieved mostly at the early stage, is one of the important observables[1] for high-energy collisions, since the degree of baryon stopping affects the overall dynamical evolution of these collisions. It affects the processes of initial parton equilibration[2], particle production[3], thermal and/or chemical equilibration[4], and the development of collective expansion[5]. Information on baryon transport may be experimentally accessed by the measurement of the ratio of the anti-proton to proton yields ($\overline{p}/p$).

We report the ratio of the mid-rapidity anti-proton to proton yields in Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 130$ GeV measured by the STAR experiment at RHIC. For minimum bias collisions, within the rapidity and transverse momentum range of $|y| < 0.5$ and $0.4 < p_t < 1.0$ GeV/c, the $\overline{p}/p$ ratio is found to be $0.65 \pm 0.03_{(\mathrm{stat.})} \pm 0.07_{(\mathrm{syst.})}$ independent of either transverse momentum or rapidity. No strong centrality dependence is observed in the centrality range measured. The value of the $\overline{p}/p$ ratio indicates that although p-$\overline{p}$ pair production becomes important at mid-rapidity, a significant excess of baryons over anti-baryons is still present in heavy ion collisions at RHIC.

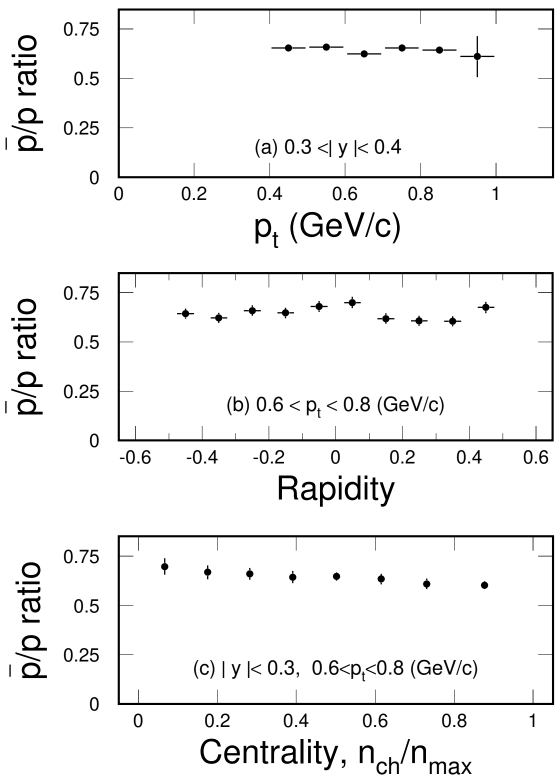

Figure 1: *The anti-proton to proton ratios (a) integrated over the rapidity range $0.3 < |y| < 0.4$ as a function of transverse momentum p_t; (b) integrated over the transverse momentum range $0.6 < p_t < 0.8$ GeV/c as a function of rapidity in minimum bias Au+Au collisions; and (c) integrated over the mid-rapidity region ($|y| < 0.3$ and $0.6 < p_t < 0.8$ GeV/c) anti-proton to proton ratio ($\overline{p}/p$) as a function of the collision centrality in Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 130$ GeV. Errors are statistical only. The overall systematic errors are estimated to be 10%.*

Footnotes and References

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