Stopping and rapidity dependent particle production in Au+Au collisions at $\sqrt{s_{NN}} =$ 62.4 GeV

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The BRAHMS experiment at RHIC has taken data from Au+Au collisions at $\sqrt{s_{NN}} = 62.4$ GeV, a beam energy bridging the gap in the energy systematics between the SPS and the RHIC top energy regimes.

The BRAHMS spectrometer has two moveable arms, enabling measurements of identified hadrons over a large rapidity range ($y \approx 0 - 4$) and thus offering a unique possibility to study the longitudinal dynamics of the fireball and in particular the nuclear stopping. The degree of stopping is extracted from the net baryon yield, $(N_B - N_{\bar{B}})$. At the RHIC top energy ($\sqrt{s_{NN}} =$ 200 GeV) the situation approaches the Bjorken scenario of full transparency, although there is still significant net baryon transport to the midrapidity region. Extrapolated BRAHMS data from Au+Au collisions at $\sqrt{s_{NN}} =$ 200 GeV, with $y_{beam} = 5.4$, reveals a violation of the linear scaling of the rapidity loss established at lower energies (AGS and SPS). In the present case ($\sqrt{s_{NN}} = 62.4GeV$), the beam rapidity is $y_{beam} = 4.2$. Hence the fragmentation region falls within the BRAHMS acceptance allowing a precise determination of the rapidity loss. The detailed shape of near-4π meson rapidity distributions also provide information on the longitudinal expansion of the fireball. The chemical conditions in all parts of the reaction zone, as the baryochemical potential and the strangeness content, can be explored directly.

In this work, we will present results from the Au+Au collisions at $\sqrt{s_{NN}} = 62.4GeV$ at RHIC regarding rapidity densities and invariant spectra of the charged hadrons measurable at BRAHMS ($\pi^{\pm}$,$K^{\pm}$, p and $\bar{p}$). In particular, the net-proton rapidity distribution will be discussed. Particle-antiparticle ratios as a function of rapidity and transverse momenta will also be shown, together with the K/π ratio, which is of particular interest. Comparisons

will be made to results from heavy-ion collisions at different energies, and to model calculations.