Progress in BRAHMS

K. Hagel, R. Wada, J. B. Natowitz and the BRAHMS Collaboration

The final data with BRAHMS were taken in 2006. We have spent the last year in particular completing the analyses of the 200 GeV Cu + Cu data, the 200 GeV p + p data of run V and the 62.4 GeV p + p data of run VI. Several papers are in preparation.

Our analysis at the Cyclotron Institute and focused on completing the analysis of the 200 GeV p + p data of run V. We have analyzed the transverse momentum spectra extracted[1] to extract rapidity densities and information on stopping in p + p collisions and limiting fragmentation of both the rapidity densities and net proton distributions. Fig. 1 shows the rapidity densities of produced particles for both 62 GeV and 200 GeV plotted as a function of $y-y_{beam}$. We note that the forward rapidity data of particles at both energies join smoothly. This indicates a surprising phenomenon where the mechanism seems to be dictated by the difference from the beam rapidity regardless of the energy of the beam. This observation of the so called mechanism of limiting fragmentation has been observed and reported in a wide variety of RHIC data results.

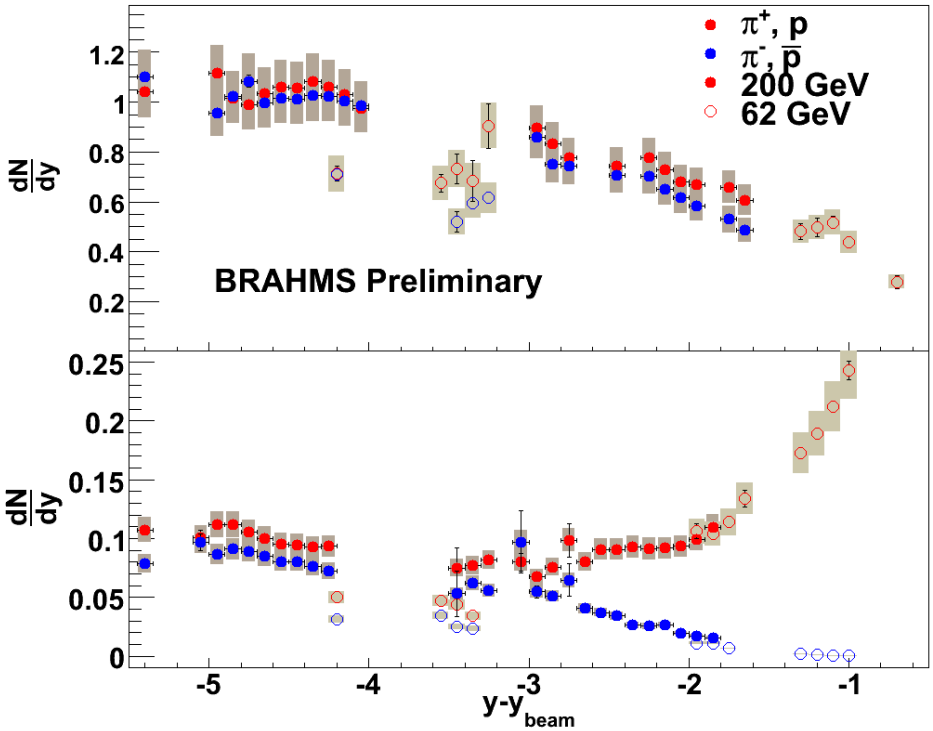

FIG. 1. Rapidity densities of produced particles in 200 and 62 GeV p + p collisions as a function of $y-y_{beam}$.

Fig. 2 shows the net proton dN/dy of both energies plotted as a function of the same variable. We have also included data from NA49 at 17.2 GeV. We observe remarkably consistent systematics that range from 17.2 GeV to 200 GeV. The solid curve in figure 2 shows the function $0.6\exp(y-y_{beam})$. This is the behavior expected in dN/dy when dN/dx is constant [2].

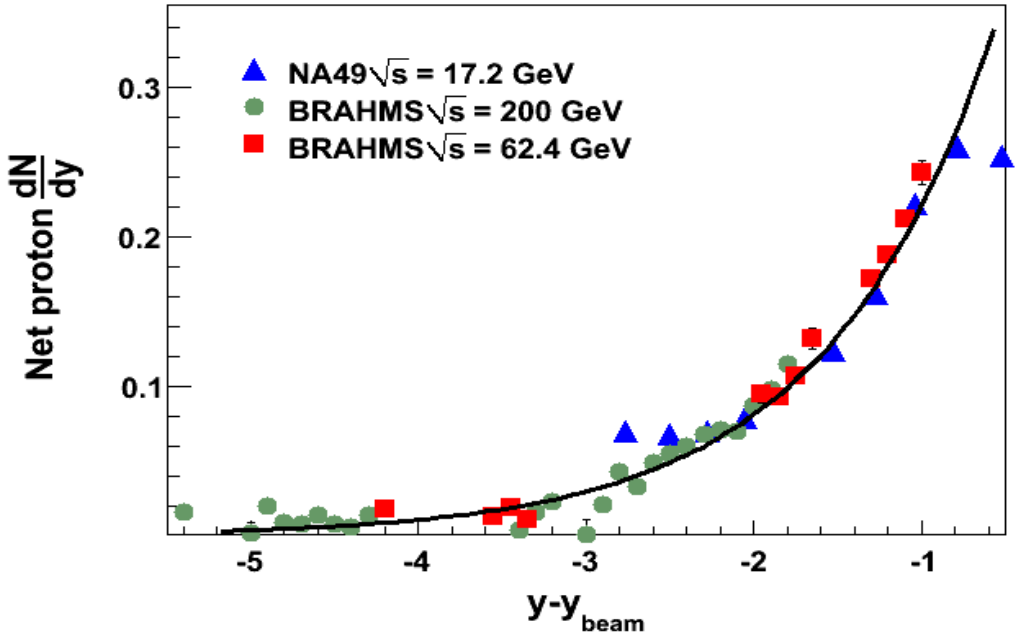

FIG. 2. Net proton dN/dy as a function of $y-y_{beam}$. The solid line represents the function $0.6\exp(y-y_{beam})$.

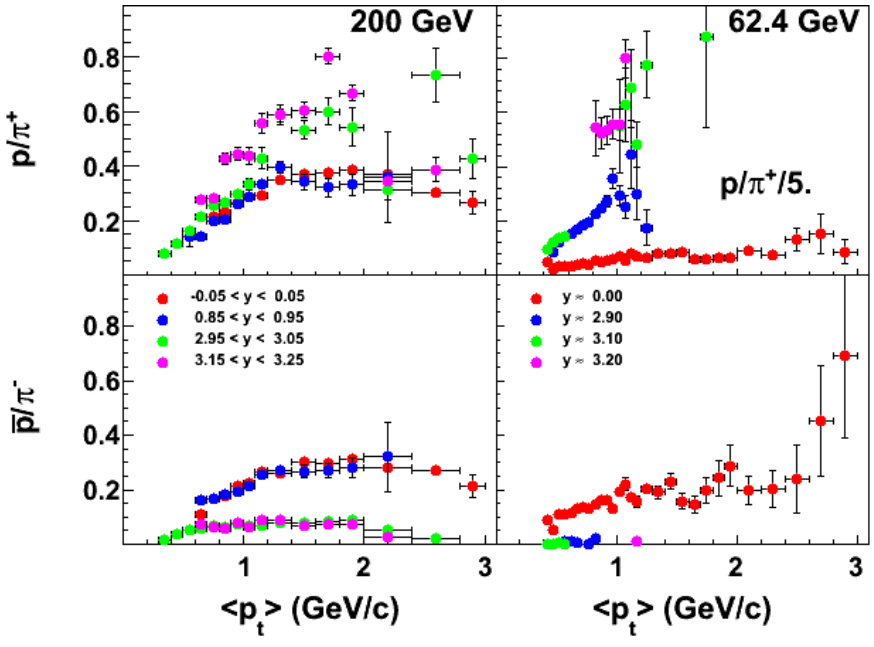

FIG. 3. p/pi for 200 and 62.4 GeV for various rapidities.

We also extracted p/π and K/π ratios for the different rapidities. Fig. 3 shows the p/π^+ and $pbar/\pi^-$ ratios for 200 and 62 GeV. We note an increase in p/π^+ and a decrease in $pbar/\pi^-$ with rapidity. We also note a stronger dependence of both p/π^+ and $pbar/\pi^-$ for the 62.4 GeV data. This probably results from the fact that the higher rapidity data at the lower energy is nearer to the beam rapidity of 4.2 than data at a similar rapidity at the higher energy. These data have been used to make conclusions regarding in medium effects by comparing them to the heavy ion data[3].

Fig. 4 shows the K^+/π^+ and K^-/π^- ratios for different rapidities at 200 and 62.4 GeV. A decrease in both K^+/π^+ and K^-/π^- with rapidity is observed. This data could provide information on strangeness enhancement (or the lack thereof) in p + p collisions.

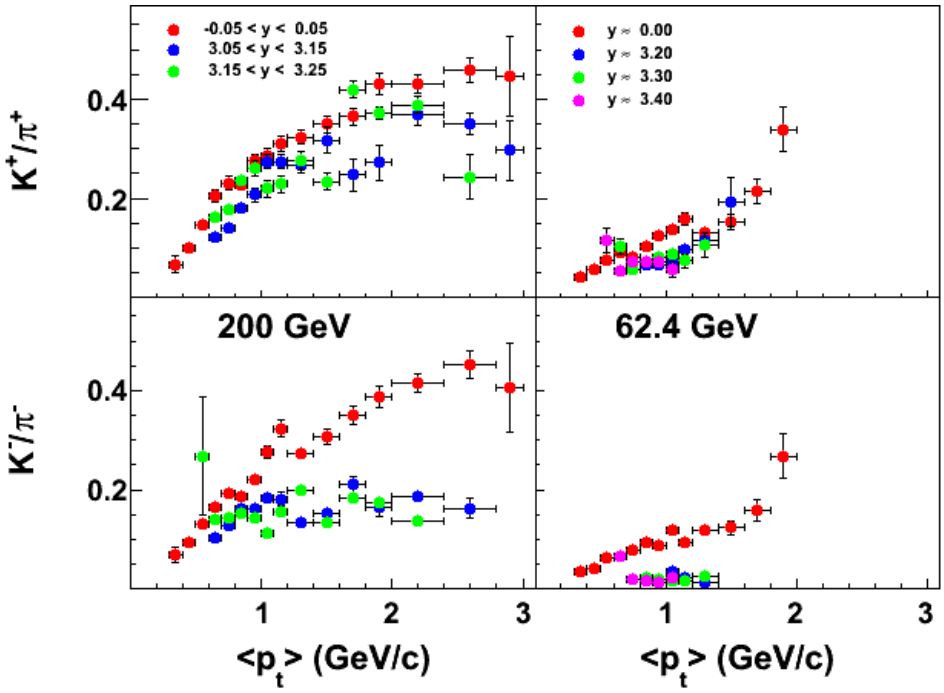

FIG. 4. K/pi for 200 and 62.4 GeV for various rapidities.

The results of the 200 and 62.4 GeV p + p data are summarized in a detailed paper that is in preparation by the BRAHMS collaboration.

[1] K. Hagel *et al.*, *Progress in Research*, Cyclotron Institute, Texas A&M University (2007-2008), p.II-9.

[2] Batisita and Covolan, Phys. Rev. D **59**, 054006 (1999).

[3] I. G. Arsene *et al.(* BRAHMS Collaboration), in preparation.