Kinetic freeze-out at RHIC

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At the recent Quark Matter 2001 conference[1], mid-rapidity transverse momentum distributions of $\pi^{\pm}$, $K^{\pm}$ and $p(\overline{p})$ from Au+Au collisions at $\sqrt{s_{NN}}$ = 130 GeV were reported. Those distribution were studied as a function of particle mass and collision centrality. As observed at lower energy heavy ion collisions[2], one found that the slope parameter of the transverse momentum distributions depends on the mass of the particle under study: the larger the mass, the higher the value of the slope parameter (see Figure 1).

In order to further characterize the p_T distributions and isolate the collective component from the slope of the distributions, a phenomenological hydrodynamic model[3] calculation were performed and fitted to the measured distributions. The STAR[4] preliminary transverse momentum distribution of π^-, K^-, and $\overline{p}$ and the hydro results (lines) are shown in Figure 1(top) and the extracted slope parameters are shown in Figure 1 (bottom). Slope parameters from the SPS energies are also shwon in the figure as open symbols. From these plots one finds: (i) The effect of radial flow is somewhat stranger at this RHIC energy than those from CERN SPS energies; (ii) The freeze-out temperature parameters are similar for both RHIC and SPS collisions; (iii) At both collisions at 40 AGeV (open triangle and squares) and 158 AGeV (open circles) heavy ion collisions, kinetic freeze-out at a similar condition[5].

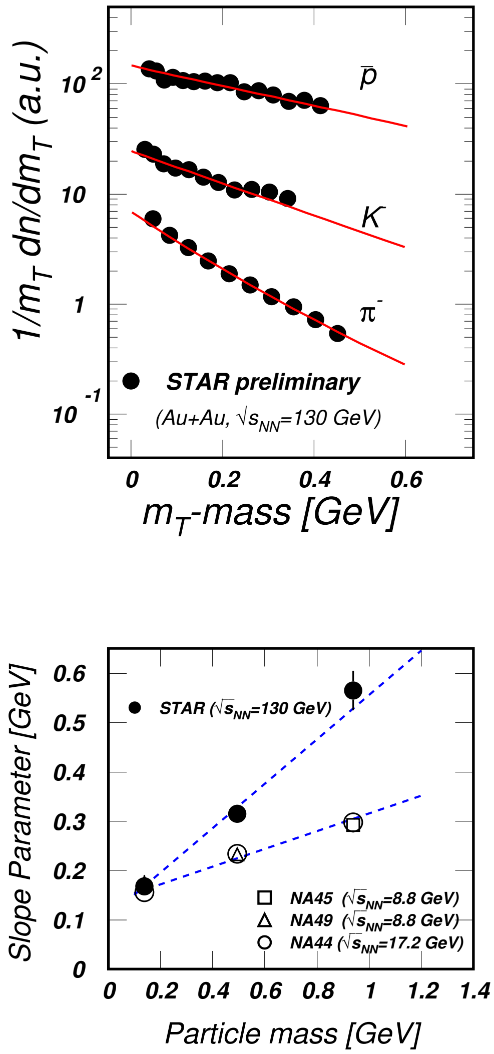

Figure 1: *STAR preliminary transverse momentum distributions of π^-, K^-, and $\overline{p}$ (top). Hydro results are represtented as line. Slope parameters are listed in the bottom plot along with the SPS results. Clearly, the plots show that the effect of radial flow is somewhat stranger at this RHIC energy than those from CERN SPS energies.*

Footnotes and References

[1] *'Quark Matter 2001 Proceedings'*, Stony Brook, January 15-20, 2001.

[2] I. Beadern *et al.* (NA44 Collaboration), Phys. Rev. Lett., **78**, 2080(1997).

[3] S. Esumi, S. Chapman, H. van Hecke, and N.Xu, Phys. Rev. **C55**, R2163(1997); E. Schnedermann, J. Sollfrank, and U. Heinz, Phys. Rev. **C48**, 2462(1993).

[4] J. Harris, (STAR Collaboration) *'Quark Matter 2001 Proceedings'*, Stony Brook, January 15-20, 2001.

[5] N. Xu, *'Quark Matter 2001 Proceedings'*.