Hadron production in Au+Au collisions at $\sqrt{s_{NN}}$=200 GeV from STAR

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Ultra-relativistic heavy ion collisions provide unique environment to study particle production mechanisms in the matter under extreme conditions of high temperature and energy densities. Different mechanisms govern hadron formation in the different kinematic regions: it is believed that at large transverse momenta, particle production in ultra-relativistic heavy ion collision is dominated by jet fragmentation, and at low momenta by soft particle production, well described by hydro-dynamical models [1].

The measurement reported here was carried out with the data sample of minimum bias triggered Au+Au collisions events collected at the center-of-mass energy per nuclear-nuclear pair of 200 GeV in the Run-4 at the Relativistic Heavy Ion Collider (RHIC) by the STAR (Solenoidal Tracker at RHIC) experiment [2]. The magnet was operated at ±0.5 T.

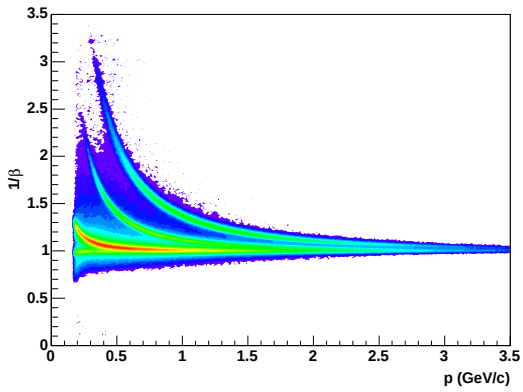

FIG. 1: $1/\beta$ vs. momentum for pions, kaons and (anti-)protons from TOF at 200 GeV Au+Au collisions.

For charged stable hadrons, the TPC provides π/K $(\pi + K/p)$ identification to $p_T \sim 0.7$ (1.1) GeV/c via the specific energy loss (dE/dx) measurement [3]. This PID capacity can be further enhanced by the Time-Of-Flight system (TOF). The TOF with a time resolution of ∼85 ps at STAR is able to identify π/K to $p_T \sim 1.8$ GeV/c and $\pi + K/p$ to 3.0 GeV [4, 5], as demonstrated in Fig. 1.

Fig. 2 shows the p/π ratio in different centrality bins. The significant baryon over meson enhancement ("baryon-meson puzzle") has been measured. p/π ratio peaks are at $p_T \sim 2.25$ GeV/c and then show decrease for $p_T > 2.5$ GeV/c. This is totally consistent with the results from Au+Au 62.4 GeV collisions and it qualitatively agrees with coalescence prediction.

The particles' spectra will be studied in the near future. The particle/anti-particle ratios and the nuclear modification factors (R_{AA} and R_{CP}) will be given soon.

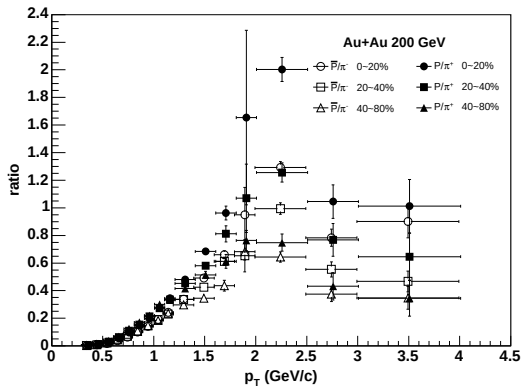

FIG. 2: p/π ratio as a function of p_T in different centrality bins.

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[3] M. Anderson *et al.*, Nucl. Instrum. Meth. A **499**, 659 (2003).
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