Charged-Particle Pseudorapidity Densities for Au+Au Collisions at RHIC

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We have measured charged-particle pseudorapidity densities for Au+Au collisions at energies of $\sqrt{s_{NN}}$=130 GeV and 200 GeV as a function of reaction centrality[1-2]. These data provide essential clues as to the underlying reaction mechanisms and as to the conditions achieved in the ultrarelativistic collisions. It has been conjectured that new phenomena related to nonperturbative QCD might occur at the highest RHIC energy[3]. A saturation in the number of parton collisions in central nucleus-nucleus collisions could lead, for example, to a limit on particle production at midrapidity. Several subcomponents of the BRAHMS experiment at RHIC were used for the measurements. Coaxial arrays of Si strip detectors and scintillator tile detectors measured particle production near midrapidity. Arrays of Cherenkov radiators mounted onto phototubes determined the charged-particle production closer to beam rapidity. In addition, a time-projection chamber located near midrapidity offered a quasi-independent measurement of the charged-particle densities at several angles, thus making it possible to check the analysis procedures. This talk will present the experimental charged-particle distributions at the two RHIC energies. The data will be characterized in terms of relative contributions of "soft" and "hard" scattering components at both mid- and forward-rapidities. Model calculations that include parton saturation effects and alternative calculations based on a multi-phase transport picture[4] will be compared to the data. The data at more forward rapidity will be discussed in terms of a limiting fragmentation picture in which the excitation of the fragment baryons saturate at modest energy, independent of system size. Overall, a general characterization of charged-particle production at RHIC energies will be developed.

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