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oral **Search for QCD Hawking Radiation in Heavy Ion Collisions**

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A wide variety of measurements at RHIC, for example v_2 and energy loss, suggest that the partonic matter created in heavy collisions thermalizes very early. One possible mechanism for this is the creation of the QCD analogue to gravitational black holes [1]. Such objects have no memory of their creation and radiate with a characteristic temperature T that can depend only on their energy, charge and angular momentum. This hypothesis is consistent with the growth of multiplicity with $\sqrt{s}$ in e^+e^- collisions and the thermal temperature observed at LEP. For central heavy ion collisions the angular momentum of the system is approximately zero and the model predicts a universal dependence of the chemical freeze-out temperature on the ratios of charge to transverse energy. This prediction can be tested against BRAHMS data since the very wide angular and p_T acceptance of the experiment, combined with excellent particle identification allows both quantities to be measured as a function of rapidity and $\sqrt{s_{NN}}$. We have fitted BRAHMS data on $\pi^{\pm}, K^{\pm}, p$ and $\bar{p}$ from central Au+Au collisions at several rapidities at $\sqrt{s_{NN}} = 62$ and 200GeV using the grand canonical ensemble. This was done using the THERMUS code [2]. The experimental dependence of the temperature on the ratio of charge to transverse energy will be compared to the Hawking radiation predictions. This model also predicts that the temperature of the system should decrease as the angular momentum increases. BRAHMS can vary the angular momentum of the system by looking at non-central collisions at forward rapidity. The angular momentum is simply the total z component of the momentum times the impact parameter. By comparing data sets at different energy, centrality and rapidity we can select systems with the same ratio of baryon number to energy but different angular momentum. This will allow us to isolate the effect of angular momentum on temperature. Finally we will present options for future study at RHIC and LHC.

References

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