

## Percolation of Color Sources and the Equation of State of QGP in central Au-Au collisions at $\sqrt{s_{NN}} = 200 \text{ GeV}$

The Color String Percolation Model (CSPM)[1] is used to determine the equation of state (EOS) of the Quark-Gluon Plasma (QGP) produced in central Au-Au collisions at  $\sqrt{s_{NN}} = 200 \text{ A GeV}$  using STAR data at RHIC. When the initial density of interacting colored strings exceeds the 2D percolation threshold a cluster is formed, which defines the onset of color deconfinement. These interactions also produce fluctuations in the string tension which transforms the Schwinger particle (gluon) production mechanism into a maximum entropy thermal distribution analogous to QCD Hawking-Unruh radiation. The single string tension is determined by identifying the known value of the universal hadron limiting temperature  $T_c = 167.7 \pm 2.6 \text{ MeV}$  with the CSPM temperature at the critical percolation threshold parameter  $\xi_c = 1.2$ . At mid-rapidity the initial Bjorken energy density and the initial temperature determine the number of degrees of freedom consistent with the formation of a  $\sim 2+1$  flavor QGP. An analytic expression for the equation of state, the sound velocity  $C_s^2(\xi)$  is obtained in CSPM. The CSPM  $C_s^2(\xi)$  and the bulk thermodynamic values energy density  $\varepsilon/T^4$  and entropy density  $s/T^3$  are in excellent agreement in the phase transition region with recent lattice QCD simulations (LQCD) by the HotQCD Collaboration [2].

[1]. M. A. Braun, C. Pajares, Eu. Phys. J. C16, 349 (2000).

[2]. A. Bazavov et al., Phys. Rev. D80, 014504 (2009).

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