

A SPECIFIC HEAT OF NUCLEAR MEDIUM PROBED BY K_S^0 MESONS PRODUCED IN AU+AU COLLISIONS AT RHIC

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The data [1] on spectra of K_S^0 mesons measured by the STAR Collaboration in Au+Au collisions at various centralities characterized by different multiplicity densities of negative particles were analyzed in the z-scaling approach [2,3]. The transverse momentum distributions obtained in the BES-I program at RHIC were accumulated in seven centrality classes from the most central 0-5% to peripheral 60-80% collisions in the rapidity range $|y| < 0.5$. These data and the earlier STAR data at $\sqrt{s_{NN}} = 62, 130$ and 200 GeV allow us a detail study of the energy and centrality dependence of K_S^0 -meson production in a wide range of $\sqrt{s_{NN}} = 7.7-200$ GeV.

The scaling function $\psi(z)$ was constructed and the self-similarity of K_S^0 -meson production was confirmed. It was found that the model parameter c_{AuAu} interpreted as a specific heat of produced medium depends on collision energy. The scaling behavior is consistent with an abrupt decrease of c_{AuAu} from the value of 0.16 at $\sqrt{s_{NN}} = 7.7$ and 11.5 GeV to about 0.09 at the top RHIC energy. At $\sqrt{s_{NN}} = 39$ GeV, a kink in the significant drop of this parameter is observed, as well as an indication of its flattening at higher $\sqrt{s_{NN}}$. The non-trivial dependence of c_{AuAu} on the collision energy obtained from the z-scaling of K_S^0 -meson production shows that the strange probe is much more sensitive to properties of nuclear medium than a non-identified negative hadron [3]. The irregularities in the behavior of the specific heat parameter c_{AuAu} could indicate existence of a phase transition in nuclear matter.

1. J. Adam et al. (STAR Collaboration), Phys. Rev. C 102, 034909 (2020).
2. M. Tokarev et al., Phys. Part. Nucl. 51, 141 (2020).
3. M. Tokarev, A. Kechechyan, and I. Zborovský, Nucl. Phys. A 993, 121646 (2020).