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Average transverse energy density for pions, kaons, φ-mesons and Ω-hyperons in the most central A+A collisions at RHIC and LHC

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We study the behavior of the average transverse energy density (<dEt/dy>) of various identified particles produced at midrapidity in relativistic nucleus-nucleus collisions vs. the collision energy from RHIC to LHC. The analysis covers pions and 3 types of particles with strangess: kaons, φ-mesons (1020) and Ω-hyperons (Ω^- and anti-Ω^+) identified in central Au+Au and Pb+Pb collisions at energies from √sNN = 39 GeV to 2.76 TeV. For each type of particles 'i", used in the present work, values of <dEt/dy>i were obtained in our previos studies [1,2].

The dependence of (<dEt/dy>) on the √sNN is well approximated by a power function of the form $Q^*(\sqrt{sNN})^n$. An interesting discovery is the statistical indistinguishability of the power law fits with parameter n for all studied particles (Ω, φ, K, π). This leads to a remarkable property: the ratios of the average transverse energies of φ-mesons to these particles vs. the collision energy √sNN do not depend on the collisioof nucleus-nucleus interactions.

We discuss possible interpretations of the discovered energy independence of these ratios from the standpoint of particle production in the multipomeron exchange model, that provides the possibilty to estimate the value of string tension parameter of quark-gluon string clusters forrned in central A+A collisions.

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[2] O. Shaposhnikova, A. Marova and G. Feofilov, Open and Hidden Strangeness with Kaons and ϕ-Mesons in Bjorken Energy Density Approach for Central Collisions from SPS to LHC, Physics of Particles and Nuclei, 2024, Vol. 55, No. 4, pp. 1134–1139. © Pleiades Publishing, Ltd., 2024.

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