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Influence of quark content and collision geometry on proton production in heavy ion collisions

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Protons are one of the well-studied baryons, but the process of proton production in relativistic heavy ions collisions is still not well studied. It is possible to study the production of protons in nucleus-nucleus collisions, including by measuring the factors of nuclear modification (R_{AB}). Previously R_{AB} for protons were measured in symmetric Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV. Comparison of Au+Au results with asymmetric Cu+Au system allows to study the influence of collision geometry on proton production. In order to investigate influence of quark content on production of protons consisting of three quarks comparison with φ, π^0-mesons (quark antiquark pairs) was provided in Cu+Au and Au+Au collisions at the collision energy of 200 GeV. Such information can improve our understanding of quark-gluon plasma and recombination model. The results of the research concluded that for Cu+Au and Au+Au collisions R_{AB} values for protons are consistent at similar number of participants. It seems that proton production scales with the average size of the nuclear overlap region and do not depends on the details of its shape. For the most central Cu+Au collisions proton yields are enhanced (R_{AB} > 1) at p_T > 2 GeV/c, while π^0 and φ-mesons yields are suppressed. Observed difference in R_{AB} values for protons, φ and π^0-mesons disappears from central to peripheral collisions.

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