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## Charge correlations and strongly intensive fluctuations in ultrarelativistic nuclear collisions in the string model

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The fluctuations of the net electric charge of hadrons, produced in ultrarelativistic heavy ion collisions, were proposed as one of the indicators of the formation of a quark-gluon plasma [1,2]. They also carry important information on the collective dynamical effects in AA collisions [3,4].

Experimentally, they are studied in terms of dynamical fluctuation parameter  $\nu_{dyn}$  and the balance functions. These observables showed to be robust against volume fluctuations and centrality class width, being therefore strongly intensive variables [5].

The comparison of theoretical predictions of the net charge fluctuations, initially made in statistical models [3, 6, 7], does not allow unambiguous conclusions about the formation of quark-gluon plasma in ultrarelativistic heavy ion collisions at RHIC and LHC. It was shown [8] that the experimental behavior of the net charge fluctuations, including the dependence on the width of the pseudorapidity window, is successfully described by the string model, and its dependence on centrality is related to the average string tension. For the more detailed study, the method of net charge long-range correlations in the windows separated by rapidity has been proposed for the better exclusion the short-range correlation effects [8].

In this paper we calculate the strongly intensive correlations and fluctuations of produced hadrons in a string-partonic Monte Carlo model [9, 10], taking into account fusion of quark-gluon strings [11,12], finite rapidity width of strings and explicit charge conservation. The model successfully describes the main features of forward-backward correlations between multiplicities and transverse momentum in pp and Pb-Pb collisions at LHC energy [13, 14]. We demonstrate that the centrality dependence of the width of balance function as well as dynamical net charge fluctuation can be explained by formation in central AA collisions of the strings of higher string tension. We provide the predictions for net charge correlations in Pb-Pb collisions at LHC energies and discuss the applicability of the method at SPS and NICA energies.

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### References

- [1] S. Jeon and V. Koch, Phys. Rev. Lett. 85 (2000) 2076.
- [2] M. Asakawa, U. Heinz, and B. Müller, Phys. Rev. Lett. 85 (2000) 2072.
- [3] S. Jeon and V. Koch, Phys. Rev. Lett. 85, 2076 (2000).
- [4] C. Pruneau, S. Gavin and S. Voloshin, Phys. Rev. C 66, 044904 (2002).
- [5] M. Gazdzicki, M. I. Gorenstein, M. Mackowiak-Pawłowska, Phys. Rev. C 88, 024907 (2013)
- [6] M. Asakawa, U. Heinz and B. Müller, Phys. Rev. Lett. 85, 2072 (2000).
- [7] E.V. Shuryak, M.A. Stephanov, Phys. Rev. C 63, 064903 (2001).
- [8] A. Titov, V. Vechernin, PoS (Baldin ISHEPP XXI) 047, 2012.
- [9] V. N. Kovalenko. Phys. Atom. Nucl. 76, 1189 (2013).
- [10] V. Kovalenko, V. Vechernin, PoS (Baldin ISHEPP XXI) 072.
- [11] M.A. Braun, C. Pajares, and V.V. Vechernin, Phys. Let. B 493, 54 (2000).
- [12] M. Braun, R. Kolevatov, C. Pajares, and V. Vechernin, Eur. Phys. J. C 32, 535 (2004)
- [13] V. Kovalenko, V. Vechernin, EPJ Web of Conferences 66, 04015 (2014).
- [14] I. Altsybeev, KnE Energy and Physics ICPPA2017, 304-312, 2018, arXiv:1711.04844 [nucl-ex].

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