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Evidence for the QCD tricritical endpoint existence at NICA-FAIR energies

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I would like to present several remarkable irregularities at chemical freeze-out which are found using an advanced version of the hadron resonance gas model. The most prominent of them are the sharp peaks of the trace anomaly and baryonic charge density existing at chemical freeze-out at the center-of-mass energies 4.9 GeV and 9.2 GeV. They are accompanied by two sets of highly correlated quasi-plateaus in the collision energy dependence of the entropy per baryon, total pion number per baryon, and thermal pion number per baryon which are found at the center-of-mass energies 3.8–4.9 GeV and 7.6–9.2 GeV. The low-energy set of quasi-plateaus was predicted a long time ago. On the basis of the generalized shock-adiabat model I show that the low-energy correlated quasi-plateaus give evidence for the anomalous thermodynamic properties inside the mixed phase found at the center-of-mass energies 4.3–4.9 GeV. In addition I would like to discuss the thermostatic properties of the mixed phase and the ones of an exponential mass spectrum of hadrons and to present the practical conclusions for the chemical equilibration of strangeness in heavy ion collisions. Using the similarity of low- and high-energy irregularities I argue that the high-energy correlated quasi-plateaus may correspond to a second phase transition. Its possible origin and a possible location of the tricritical endpoint of QCD matter phase diagram are also discussed.

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