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A strong influence of weak decays on chemical freeze-out parameters of hadrons measured in high energy nuclear collisions found within the advanced Hadron Resonance Gas Model

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The advanced Hadron Resonance Gas Model (HRGM) which correctly accounts for the sequential strong and weak decays is developed. Our analysis of the STAR experiment data on hadronic multiplicities demonstrates that taking into account for the weak decays is extremely important to have a model that can describe the data with very high accuracy.

We report our results on fitting the particle yields measured at midrapidity in central nuclear collisions by the STAR Collaboration during the Beam Energy Scan I (BES) program for the center-of-mass collision energies $\sqrt{s_{NN}} = 7.7 - 200$ GeV using an advanced HRGM based on the induced surface tension equation of state [1, 2] with the multicomponent hard-core repulsion.

Two fitting schemes are used: with and without weak decays. The chemical freeze-out (CFO) parameters extracted from the fit show a significant influence of weak decays on the fit quality. Moreover, their inclusion into the analysis of BES I data leads to decreasing the CFO temperature of hadrons by about 10–15 MeV. For the highest RHIC energies of collision the new CFO temperatures of hadrons, for the first time, are in complete agreement with the ones obtained earlier for the ALICE energy $\sqrt{s_{NN}} = 2.76$ TeV [2, 3]. Furthermore, it is found that the new CFO temperatures of hadrons practically coincide with the lattice QCD results on pseudocritical temperatures at small values of baryonic chemical potential. Remarkably, it is shown that the CFO parameters of light (anti-, hyper-) nuclei obtained in [3] are not affected by these modifications.

References:

- [1] K. A. Bugaev et al., Nucl. Phys. A 970, (2018) 133–155.
- [2] K. A. Bugaev et al., Eur. Phys. J. A 56, (2020) 293–1-15.
- [3] O. V. Vitiuk et al., Eur. Phys. J. A 57, (2021) 74 1-12.

Primary author: ZHEREBTSOVA, Elisaveta (INR RAS & NRNU MEPhI)

Presenter: ZHEREBTSOVA, Elisaveta (INR RAS & NRNU MEPhI)