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# Nuclear system size scan for freeze-out properties and baryon-strangeness correlation in relativistic heavy-ion collisions by using a multiphase transport model

In this study, we employ a multiphase transport (AMPT) model for considering the bulk properties at the freeze-out stage for $^{10}\mathrm{B}+^{10}\mathrm{B}$, $^{12}\mathrm{C}+^{12}\mathrm{C}$, $^{16}\mathrm{O}+^{16}\mathrm{O}$, $^{20}\mathrm{Ne}+^{20}\mathrm{Ne}$, $^{40}\mathrm{Ca}+^{40}\mathrm{Ca}$, $^{96}\mathrm{Zr}+^{96}\mathrm{Zr}$, and $^{197}\mathrm{Au}+^{197}\mathrm{Au}$ collisions at RHIC energies $\sqrt{s_{NN}}$ of 200, 20, and 7.7 GeV.
We use a statistical thermal model to extract the parameters at the chemical freeze-out stage, which agree with those from other thermal model calculations. It was found that there is a competitive relationship between the kinetic freeze-out parameter $T_{kin}$ and the radial expansion velocity $\beta_T$, which also agrees with the STAR or ALICE results. We found that the chemical freeze-out strangeness potential $\mu_s$ remains constant in all collision systems and that the fireball radius $R$ is dominated by $\langle \mathrm{N}_{\mathrm{Part}} \rangle$, which can be well fitted by a function of $a \langle \mathrm{N}_{\mathrm{Part}} \rangle^b$ with $b \approx 1/3$.
In the same context, the system size dependence of baryon-strangeness (BS) correlation also has been investigated. The combination of different hadrons affects BS correlations significantly. We find when the maximum rapidity acceptance $y_{\mathrm{max}} > 3$, these coefficients are independent of the combination of different hadrons in the final state based on the AMPT model.

**Primary author:** Mr DONGFANG, Wang (Fudan university)

**Co-authors:** Mr YUGANG, Ma (Fudan university); Mr SONG, Zhang (Fudan university)

**Presenter:** Mr DONGFANG, Wang (Fudan university)