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Probing QGP medium effect on jet observables in small systems with AMPT + new hadronization model

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Jet observables, including jet fragmentation transverse momentum j_{T}, parallel momentum $p_{||}$, jet fragmentation function ξ and jet constituent transverse momentum $p_{\mathrm{T,track}}$ distributions, have been investigated in p + p and p + Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV via a multiphase transport model (AMPT) [1,2] with new hadronization model which contains both dynamical quark coalescence and fragmentation schemes [3]. With the new hadronization model, the recent ALICE measurements of j_{T} distributions can be quantitatively described, especially for low and intermediate j_{T} regions. We observe that high-energy jets have more large-j_{T} particles than low-energy jets, which are consistent with the experimental measurements. Importantly, the predicted ratio of j_{T} distributions between p + Pb and p + p shows a sizeable enhancement above unity of low-j_{T} particles and a suppression of intermediate-j_{T} particles, which indicates the possible effects from jet-medium interactions in small systems. This jet observable is suggested to probe the QGP medium effects in small systems in this talk. On the other hand, the $p_{||}$ ratio of jet distribution is proposed as a complementary observable to probe jet-medium response in small systems.

We also implement jet fragmentation ξ and $p_{\mathrm{T,track}}$ distributions and compare to CMS measurements. The similar enhancement of soft jet particles and suppression of hard jet particles appear in both new hadronization model and original AMPT hadronization model, which demonstrate that this enhancement (suppression) is model independent. We also systematically study the difference between two hadronization models, and find out that it is important for studying jet observables in small systems with a proper hadronization scheme.

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