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The 107th HENPIC seminar by Dr. Wenbin Zhao (赵文彬), Peking University, June 4th, 2020, Thursday, 10:30 am (Beijing time)

Title: Collectivity & QGP signals in Large and Small systems

Speaker : Dr. Wenbin Zhao， Peking University

Abstract: The collective flow and the possible formation of the Quark-Gluon Plasma (QGP) in the small colliding systems are hot research topics in the heavy-ion community. For heavy-ion collisions, the strong collective flow, NCQ scaling and jet quenching effects are three key evidences for the formation of QGP. Recently, ALICE, ATLAS and CMS collaborations have measured the strong collective flow and the related number of constituent quark (NCQ) scaling of identified hadrons in p+p and p+Pb collisions at LHC, which are important observables for the possible hydrodynamic evolutions and to probe the partonic degree of freedom in the created small system. In this talk, we focus on the hydrodynamic model calculations for collective flow at low p_T for p+p collisions and the coalescence model calculations for the NCQ scaling of v_2 at intermediate p_T for the high multiplicity p+Pb collisions. For hydrodynamics in p+p collisions, with properly tuned parameters, iEBE-VISHNU hybrid model can describe the measured 2-particle correlations, However, our model calculations shows positive 4-particle cumulant $c_2\{4\}$, and cannot reproduce the negative $c_2\{4\}$ measured in experiment. For the quark coalescence model calculations for the NCQ scaling, it includes thermal-thermal, thermal-jet and jet-jet partons recombinations, using the thermal partons from hydrodynamics and jet partons after the energy loss of the Linear Boltzmann Transport (LBT) model. Such coalescence model calculations have also been smoothly connected with the low p_T hydrodynamic calculation and high p_T jet fragmentation. Within such combined framework, we present a nice description of the spectra and elliptic flow over the p_T range from 0 to 6 GeV, and obtain the approximately NCQ scaling at intermediate p_T as measured in experiment. We also switch off the coalescence process of partons and find that without such coalescence, one cannot describe the differential elliptic flow and related NCQ scaling at intermediate p_T. Such comparison calculations also demonstrate the importance of the partonic degree of freedom and indicate the possible formation of QGP in the high multiplicity p+Pb collisions.

[1] W. Zhao, Y. Zhou, H. Xu, W. Deng and H. Song, Phys. Lett. B 780, 495 (2018).

[2] W. Zhao, Y. Zhou, K. Murase and H. Song, arXiv:2001.06742 [nucl-th].

[3] W. Zhao, C. M. Ko, Y. X. Liu, G. Y. Qin and H. Song, arXiv:1911.00826 [nucl-th].

[4] W. Zhao, C. M. Ko, Y. X. Liu, G. Y. Qin and H. Song, arXiv:2001.10689 [nucl-th].

[5] Y. Zhou, W. Zhao, K. Murase and H. Song, arXiv:2005.02684 [nucl-th].

[6] W. Zhao, H. j. Xu and H. Song, Eur. Phys. J. C 77, no. 9, 645 (2017).