

Heavy Quark Flow as Better Probes of QGP Properties

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Azimuthal anisotropies such as the elliptic flow v_2 are important tools for the study of the properties of the quark-gluon plasma (QGP). Recent studies with parton transport models suggest [1,2] that most parton v_2 comes from the anisotropic escape of partons, not from the hydrodynamic flow, even for semi-central Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV. In this talk we will study the flavor dependence of the parton escape mechanism and address whether the escape mechanism is also dominant for heavier quarks such as strange and charm quarks [3,4]. We use a multi-phase transport (AMPT) model, which can reasonably describe the experimental data for the bulk matter [5]. We follow the entire evolution history of quarks of different flavors in AMPT and focus on the developments of strange and charm v_2 in heavy ion as well as small system collisions at RHIC and LHC energies. By performing the azimuth-randomized tests, we extract the relative contributions of the escape mechanism to the v_2 of light, strange, and charm quarks. In contrast to naive expectations, we find the charm v_2 to be much more sensitive to the hydrodynamic flow than lighter quark's v_2 . Our finding thus indicates that heavy quark flow may be better probes of the QGP properties than light quark flow.

[1] L. He, T. Edmonds, Z.-W. Lin, F. Liu, D. Molnar, and F. Wang, Phys. Lett. B 753, 506 (2016).

[2] Z.-W. Lin, L. He, T. Edmonds, F. Liu, D. Molnar, and F. Wang, Nucl. Phys. A 956, 316 (2016).

[3] H.L. Li, Z.-W. Lin, and F. Wang, J. Phys. Conf. Ser. 779, 012063 (2017).

[4] H.L. Li, Z.-W. Lin, and F. Wang, in preparation.

[5] Z.-W. Lin, Phys. Rev. C 90, 014904 (2014).

List of tracks

Heavy-flavour (open and hidden)

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