f_0(980) resonance elliptic flow and its constituent quark content

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Abstract

Deconfined quarks and gluons are expected to be created in relativistic heavy-ion collisions. According to the coalescence model, yields of exotic hadrons are expected to be strongly affected by their structures [1]. Searching for exotic state particles and studying their properties can extend our understanding of quantum chromodynamics (QCD). The $f_0(980)$ resonance is an exotic state decaying primarily into $\pi\pi$. Currently the structure and quark content of the $f_0(980)$ are unknown with several predictions from theory being a $q\bar{q}$ state, a $qq\overline{qq}$ state, a $K\overline{K}$ molecule state, or a gluonium state. We report the first $f_0(980)$ elliptic flow (v_2) measurement from 200 GeV Au+Au collisions at STAR. The transverse momentum dependence of v_2 is examined and compared to those of other hadrons (baryons and mesons). The empirical number of constituent quark (NCQ) scaling is used to investigate the constituent quark content of $f_0(980)$ [2], which may potentially address an important question in QCD. We will report our findings and discuss its implications.

[1] S. Cho, etal. (ExHIC Collaboration), Phys. Rev. Lett. 106, 212001 (2011)

[2] A. Gu, T. Edmonds, J. Zhao, F. Wang, Phys. Rev. C 101, 024908 (2020), arXiv:1902.07152