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Energy and centrality dependence of identified particle elliptic flow in relativistic heavy-ion collisions

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The Beam Energy Scan (BES) program at the RHIC facility was initiated in the year 2010 to study the Quantum Chromodynamics (QCD) phase diagram[1]. In the years 2010, 2012 and 2014 the STAR experiment recorded Au + Au collisions at \sqrt{s_{NN}} = 7.7, 11.5, 14.5, 19.6, 27, 39, and 62.4 GeV within a pseudo rapidity range of |\eta|< 1. Recently reported results from identified particle elliptic flow in minimum bias (0–80%) collisions revealed an energy dependent difference in elliptic flow between particles and antiparticles [2]. This difference is increasing with decreasing collision energy and is almost identical for all baryons. These observations attracted various theory groups, that tried to reproduce the results with different assumptions in their model calculations [3].

In this talk, we present the elliptic flow of identified particle for three centrality classes in Au + Au collisions at \sqrt{s_{NN}} = 7.7 - 62.4 GeV. The centrality dependence and the data at \sqrt{s_{NN}} = 14.5 GeV are new. Except at the lowest beam energies, we observe a similar relative v2 baryon-meson splitting for all centrality classes which is in agreement within 15% with the number-of-constituent quark scaling. The larger v2 for most particles relative to antiparticles, already observed for minimum bias collisions shows a clear centrality dependence, with the largest difference in the most central collisions. The new beam energy (14.5 GeV) and centrality dependence would be useful to distinguish between the different models or to improve their input parameters.

[1] M. M. Aggarwal et al. (STAR Collaboration), arXiv:1007.2613. [2] L. Adamczyk et al. (STAR Collaboration), Phys. Rev. Lett. 110, 142301 (2013). [3] J. Steinheimer, V. Koch, and M. Bleicher, Phys. Rev. C 86, 044903 (2013); J. Xu, et al., Phys. Rev. Lett. 112, 012301 (2014).

On behalf of collaboration:

STAR

Author: SHI, Shusu

Presenter: SHI, Shusu

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