

Probing the QCD Phase Structure with Elliptic Flow in Au+Au Collisions at $\sqrt{s_{NN}} = 7.7-19.6$ GeV at RHIC

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1 Elliptic flow (v_2) is the second harmonic coefficient in the Fourier expansion of the
2 azimuthal distribution of produced particles, relative to the reaction plane, in heavy-
3 ion collisions. This observable is sensitive to the early-stage dynamics of the system's
4 evolution and provides insights into the degrees of freedom within the medium.
5 In this talk, we will report v_2 measurements for a variety of hadrons, including $\pi^\pm$,
6 $K^\pm$, p , $\bar{p}$, K_S^0 , ϕ , Λ , $\bar{\Lambda}$, $\Xi^\pm$ and $\Omega^\pm$, based on high-statistics datasets from the second phase
7 of the RHIC Beam Energy Scan (BES-II) program measured by STAR. The scaling of v_2
8 according to the Number of Constituent Quarks (NCQ) for both particles and antiparticles
9 will be examined. Additionally, the NCQ-scaled v_2 ratios of particles such as π^+/K^+ ,
10 p/K^+ , π^-/K^- , $\bar{p}/K^-$, ϕ/K^- , Λ/K_S^0 and $\bar{\Lambda}/K_S^0$, across the energy range $\sqrt{s_{NN}} = 7.7$,
11 9.2, 11.5, 14.6, 17.3 and 19.6 GeV will be presented. The experimental measurements will
12 be compared with various model calculations, and the resulting insights will be discussed.