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Model investigations of the beam-energy dependence of the transverse momentum and flow correlations

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Extraction of the Quark-Gluon Plasma (QGP) transport properties (i.e. specific shear viscosity η/s) is a prime goal of the heavy-ion programs at the Relativistic Heavy-Ion Collider (RHIC) and the Large Hadron Collider (LHC). Correlators that are sensitive to both initial-state effects and final-state viscous attenuation can give invaluable constraints for temperature (T) and chemical potential (μ_B) dependence of η/s. The $\rho(v_2^n, \langle p_T \rangle)$ correlator, that gives the strength of the correlation between an event's mean-transverse momentum $[p_{\mathrm{T}}]$ and its v_2 magnitude, shows more sensitivity to the initial state than to final stat effects˜[1–2]. A comprehensive set of v_n^2, $[p_T]$, $\mathrm{cov}(v_2^2, [p_T])$ and $\rho(v_2^2, \langle p_T \rangle)$ calculations for Au+Au collisions spanning the beam energy range $\sqrt{s_{\mathrm{NN}}}$ = 2760–19.6 GeV using the Hydro-hybrid, AMPT and EPOS models, will be presented for several centralities and event shape selections. Our simulated results˜[1–2] show characteristic beam-energy-dependent and event shape trends that can give significant constraints for the respective influence of initial-state fluctuations, system-size, system-shape, and $\eta/s(\mu_B, T)$.

[1] N. Magdy, et al., Phys.Lett.B 821 (2021) 136625
[2] N. Magdy, et al., arXiv:2111.07406

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