The beam-energy dependence of the transverse momentum correlations and implication for the η/s extraction from STAR

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One of the primary aims of the heavy-ion programs at RHIC and the LHC is to understand the transport properties (η/s) of the quark-gluon plasma (QGP). Ongoing theoretical and experimental investigations are devoted to developing further constraints on the extractions of $\eta/s(T)$. Although these investigations have advanced the precision of η/s, more stringent constraints are still required to minimize the uncertainties associated with the initial-state and the T and μ_B dependence of η/s. The longitudinal broadening of the transverse momentum two-particle correlator $C_2\left(\Delta\eta, \Delta\varphi\right)$ [1,2] is expected to be sensitive to the magnitude of the QGP η/s. Similarly, the strength of the flow-momentum correlator, $\rho(v_n^2, \langle p_T \rangle)$ [3] is expected to give improved constraints for the heavy-ion initial conditions. The recent STAR differential measurements of the $C_2\left(\Delta\eta, \Delta\varphi\right)$ and the $\rho(v_n^2, \langle p_T \rangle)$ will be presented for beam-energies range (11.5 to 200 GeV). The excitation functions for $C_2\left(\Delta\eta, \Delta\varphi\right)$ and $\rho(v_n^2, \langle p_T \rangle)$ will be presented and compared to similar LHC measurements, as well as to theoretical calculations.

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