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System size, energy and event shape dependence of the mean transverse momentum fluctuations with ALICE at the LHC

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Measurement of the event-by-event fluctuations of the mean transverse momentum, $\langle p_{\mathrm{T}} \rangle$, help to characterize the properties of the bulk of the system created in ultrarelativistic heavy-ion collisions, called the quark-gluon plasma (QGP). The fluctuations are closely related to the dynamics of the phase transition from the QGP to a hadron gas.

In this presentation, the $\langle p_{\mathrm{T}} \rangle$ fluctuations of charged particles produced in pp, Xe-Xe and Pb-Pb collisions at the LHC will be presented. The fluctuations are measured via the integral correlator, $\langle \langle \Delta p_{\mathrm{T}} \Delta p_{\mathrm{T}} \rangle \rangle$. The strength of the correlator is found to decrease monotonically with increasing charged-particle multiplicity measured at mid-rapidity in all three systems. In Xe-Xe and Pb-Pb collisions, the multiplicity dependence of the correlator is found to deviate significantly from a simple power-law scaling and from the predictions of the HIJING and AMPT models. The observed deviation is expected to arrise from the transverse radial flow in semicentral to central heavy-ion collisions. The correlation strength is also studied in pp collisions by classifying the events based on their event shape, transverse spherocity. Jetty events feature a larger correlation strength than isotropic events. The strength and multiplicity dependence of jetty and isotropic events are compared with calculations from PYTHIA 8 and EPOS LHC models.

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