

Measuring the speed of sound of the quark-gluon plasma in ultracentral nucleus-nucleus collisions

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We show that, within the hydrodynamic framework of heavy-ion collisions, the mean transverse momentum of charged hadrons ($\langle p_t \rangle$) rises as a function of the multiplicity in ultra-central nucleus-nucleus collisions. The relative increase is proportional to the speed of sound squared (c_s^2) of the quark-gluon plasma, that is therefore accessible experimentally using ultra-central data. Based on the value of c_s^2 calculated in lattice QCD, we predict that $\langle p_t \rangle$ increases by ≈ 18 MeV between 1% and 0.001% centrality in Pb+Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV.

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