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Type: Oral

Extracting the speed of sound in the strongly-interacting matter created in relativistic nuclear collisions with the CMS experiment

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A hot and dense matter exhibiting collective flow behavior with almost no viscous dissipation has been discovered in ultrarelativistic nuclear collisions. To constrain the fundamental degrees of freedom and equation of state of this matter, this talk will present an extraction of its speed of sound using head-on lead-lead collision data collected by the CMS experiment at a center-of-mass energy per nucleon pair of 5.02 TeV. The measurement is based on an analysis of the observed charged multiplicity dependence of the average particle transverse momentum in ultracentral events (impact parameter of nearly zero), a variable which probes the system temperature as a function of entropy density at a fixed volume. Results are compared with hydrodynamic simulations and lattice QCD predictions of the equation of state at high temperatures and small chemical potential. Implications to search for QCD phase transition and the critical point are discussed.

Category

Experiment

Collaboration (if applicable)

CMS

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