



Contribution ID: 159

Type: **Oral Presentation**

Extracting the Speed of Sound from Mean Transverse Momentum Measurements in Au+Au Collisions from RHIC Beam Energy Scan-II at STAR

Tuesday, 24 March 2026 10:05 (20 minutes)

The speed of sound c_s in strongly interacting matter encodes the stiffness of the nuclear equation of state (EOS). Recent theoretical work has argued that c_s^2 can be extracted experimentally from the logarithmic slope between the mean transverse momentum $\langle p_T \rangle$ and charged multiplicity $\langle dN/d\eta \rangle$ in ultra-central collisions. In ultra-central collisions, it is conjectured that the effective interaction volume becomes fixed, leading to a sensitivity of the $\langle p_T \rangle$ to the EOS that is otherwise diluted by volume variation in more peripheral regimes. The goal is to measure the speed of sound as a function of collision energy for the majority of data taken during the STAR Beam Energy Scan Phase II. We apply this framework initially to ultra-central Au+Au collisions at $\sqrt{s_{NN}}=200$ GeV and determine the slope parameter $(d\ln\langle p_T \rangle)/d\ln\langle dN/d\eta \rangle$ which serves as a potential experimental proxy for c_s^2 . In addition, we compare our data to previous measurements at higher energy from ALICE and CMS.

Authors: BROODO, Caleb (Univ. of Houston); STAR COLLABORATION

Presenter: BROODO, Caleb (Univ. of Houston)

Session Classification: Parallel II: Bulk Properties