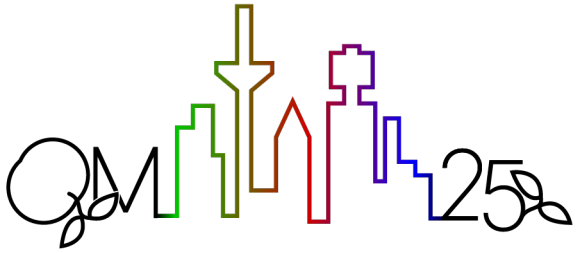

Contribution ID: **22** Type: **Oral**

The collectivity of transverse momentum fluctuations

Event-by-event fluctuations of the transverse momentum per particle $[p_T]$ have been measured in heavy-ion collisions at RHIC and LHC, but this topic has so far received less attention than anisotropic flow. Yet the physical mechanism is identical for both phenomena: A long-range correlation in the initial stages, followed by collective expansion. While the origin of anisotropic flow is a fluctuation in the shape of the fireball, that of $[p_T]$ fluctuations is a fluctuation in the initial temperature. It generates a fluctuation in the fluid velocity, which is carried over to the p_T spectrum of outgoing particles. The same fluctuation is present at all rapidities and generates a long-range correlation.

We make hydrodynamic predictions for the fluctuation of the spectrum, which is a new observable $v_0(p_T)$ introduced by Schenke, Shen and Teaney [https://arxiv.org/abs/2004.00690] which has not yet been measured, and for which first experimental results will hopefully be shown at this conference. Like anisotropic flow $v_n(p_T)$, $v_0(p_T)$ is predicted to have a strong mass ordering in the p_T range where hydrodymamics applies. We show that our hydrodynamic calculation reproduces precisely the observed dependence of $[p_T]$ fluctuations on p_T cuts which has previously been observed by PHENIX and ATLAS. We argue that the mechanism of quark coalescence should give rise to a splitting between the $v_0(p_T)$ of baryons and mesons at higher p_T, similar to that observed for anisotropic flow.

Based on Parida, Samanta, Ollitrault, Phys.Lett.B 857 (2024) 138985 [2407.17313].

Category

Theory

Collaboration (if applicable)

Primary authors: OLLITRAULT, Jean-Yves; SAMANTA, Rupam (AGH University of Krakow, Poland); Mr PARIDA, Tribhuban (IISER Berhampur)

Presenter: Mr PARIDA, Tribhuban (IISER Berhampur)

Track Classification: Correlations & fluctuations