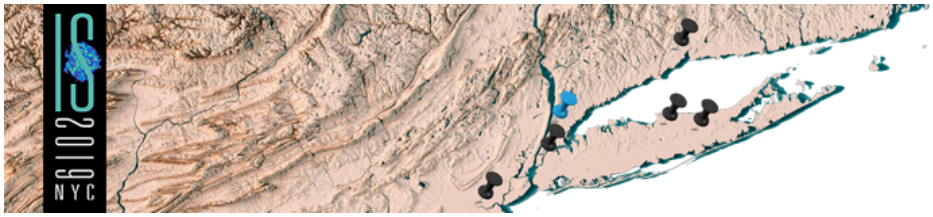

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Flow vs Nonflow in Ultracentral U-U and Be-Be Collisions

Tuesday, 25 June 2019 16:17 (1 minute)

An ongoing question in the field is if the collectivity originating in small systems arises from:

- Flow scenario: initial conditions coupled to relativistic hydrodynamics leading to independent particle emissions from the fluid hyper-surface.

or

- Non-flow scenario: genuine 2,4 etc particle correlations from, e.g. a saturation framework.

We note that, in general, the experimentally measured $v_n\{m\}$'s can include non-trivial contributions from both pictures (and mixing terms between the two) so we caution that the calculations of $v_n\{m\}$ must consider both contributions, which look different in each framework.

Using the Color-Glass Condensate (CGC) formalism in the (semi)dilute-(semi)dilute regime for $p_T \gg Q_s$, we can compare the ultra-central scaling of azimuthal anisotropies with the multiplicities of deformed ion-ion collisions. We consider deformed ion-ion collisions as a testing bed for these comparisons because due to either tip-tip or side-side collisions, one expects the geometrical shape immediately after the collision (eccentricities) to scale inversely with the final multiplicity. Because hydrodynamics is predominately driven by linear response in ultracentral collisions, this inverse scaling of $v_2\{2\}$ with dN/dy is preserved in the final hydrodynamic picture. In contrast to hydrodynamics, in the CGC framework $v_2\{2\}$ and $v_3\{2\}$ increase monotonically with the multiplicity. We repeat these calculations for Beryllium-Beryllium collisions and predict the same effect. Different parameterizations of Uranium are also studied and constrained by data. Thus, we argue that deformed ions can be a perfect testing ground for comparing the CGC to hydro pictures in small systems. Additionally, we calculate other flow observables such as $(v_2\{4\}/v_2\{2\})^4$ and symmetric cumulants, NSC(3,2). We find that due to the suppression of 4 particle correlations in our framework that the CGC picture produces an imaginary $v_2\{4\}/v_2\{2\}$ while we find a positive NSC(3,2).

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