Contribution ID: **342** Type: **Poster**

Effect of Nuclear Shape Parameters On Initial State Observables In Heavy Ion Collisions

Tuesday 5 September 2023 17:30 (2h 10m)

In heavy ion collisions, the initial state geometry plays a crucial role in determining final state observables such as elliptic flow v_2 and radial flow reflected by event-wise average transverse momentum $[p_{\mathrm{T}}]$. The initial state geometry is influenced by several nuclear shape parameters, including quadrupole deformation (β), triaxiality (γ) [1], nuclear radius (r), and skin depth (a) [2]. It is known from low-energy physics that many atomic nuclei exhibit a quadrupole shape that fluctuates around an average profile. This talk investigates the impact of nuclear shape fluctuations on initial state geometry in heavy ion collisions, focusing on eccentricity (ϵ_2) and inverse transverse size (d), which are linearly related to fluctuations of flow, i.e. $v_2 \propto \epsilon_2$ and $\delta[p_T] \propto \delta d_{\perp}$, and comparing them across different system sizes. Our aim is to quantify the effects of these parameters on initial state observables in a coherent manner. We show that overall quadrupole deformation fluctuations enhance the cumulants of ϵ_2 and d , while triaxiality fluctuations reduce the differences between prolate and oblate nuclei. Our results suggest that, in the large fluctuation limit, the initial state observables' values approach those obtained in collisions of rigid triaxial nuclei.

[1] Impact of nuclear shape fluctuations in high-energy heavy ion collisions

[2] Scaling approach to nuclear structure in high-energy heavy-ion collisions

Category

Theory

Collaboration (if applicable)

Primary author: DIMRI, Aman (Stony Brook University (US))

Co-author: JIA, Jiangyong (Stony Brook University (US))

Presenter: DIMRI, Aman (Stony Brook University (US))

Session Classification: Poster Session

Track Classification: Initial state