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Fluctuations and correlations driven by the nuclear structure in relativistic heavy ion collisions

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Relativistic heavy ion collisions, especially the recent isobar ($^{96}_{44}$Ru+$^{96}_{44}$Ru and $^{96}_{40}$Zr+$^{96}_{40}$Zr) collisions, provide an opportunity to determine the structures of the colliding nuclei with good precision. Nuclear deformation, triaxiality, and sub-nucleon structure have recently been studied by $v_n - p_T$ correlations; size and shape differences between Ru and Zr have been extracted from the multiplicity and particle correlation differences between the two isobar collision systems. In this talk, I will present the effect of nucleon size, nuclear deformation, and nuclear shape fluctuations on the final state observable of multiparticle correlations and $v_n - p_T$ correlations in heavy ion collisions. I will also discuss the impact of bulk evolutions on the precision of nuclear structure determination. Our studies indicate that precise nuclear structure may be probed, unconventionally, by relativistic heavy ion collisions.

Theory / experiment

Theory

Group or collaboration name

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