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Study of flow, fluctuation and CME background in Isobaric collisions using a transport model.

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Knowing the initial geometry and fluctuations in heavy-ion collisions has recently been shown to have important consequences on interpreting the data from the Relativistic Heavy Ion Collider (RHIC) and the Large Hadron Collider (LHC) experiments. It is also believed that measurement of higher order flow coefficients and their fluctuations can substantially improve the constraints on
the transport properties of the system formed in high energy heavy-ion collisions. In recent years, the experimental search for the Chiral Magnetic Effects (CME) has been intensively performed in heavy-ion collisions at the RHIC and the LHC. To detect the CME, a three-point correlator, $\gamma_{\alpha\beta} = \langle \cos(\phi_\alpha + \phi_\beta - 2\Psi_{RP}) \rangle$ was proposed, where ϕ is the azimuthal angle of a charged particle, the subscript $\alpha(\beta)$ denotes the charge sign of the particle (positive or negative), Ψ_{RP} is
the angle of the reaction plane of a given event, and $\langle ... \rangle$ denotes an average over all particle pairs and all the events. It has been recently shown in simplistic Monte-Carlo (MC) simulations that isobaric collisions will provide a better handle to constrain initial spatial anisotropy to similar magintude while allowing the magnetic field to vary considerably. With this overview, RHIC has now proposed to carry out an isobaric ($_{40}Zr^{96} +_{40} Zr^{96}$, $_{44}Ru^{96} +_{44} Ru^{96}$) heavy-ion collisions program at $\sqrt{s_{NN}}$ = 200 GeV. Due to the lack of partonic and hadronic interactions, the existing MC simulations of isobaric collisions are unable to predict the amount of flow, fluctuations and the CME background due to v_2. Therefore, it will be convincing to understand and estimate these observables with models which incorporates collectivity and able to reasonably reproduce experimental measurements.
This work presents final momentum space observables from isobaric
($_{40}Zr^{96} +_{40} Zr^{96}$, $_{44}Ru^{96} +_{44} Ru^{96}$) collisions generated using a transport (AMPT) model with default settings for RHIC energies. Two difference scenarios with different amount of deformation in $_{44}Ru^{96}$ and $_{40}Zr^{96}$ nuclei has been studied. In this presentation, the evolution of initial spatial anisotropies and its fluctuations will be presented as a function of centrality (N_{part}). The final monentum space anisotropy v_n (n=2, 3, 4) would be presented as a function of centrality. The as well as a function of transverse momentum (p_T) for different centrality classes. The results from these isobaric collisions are compared with Au+Au collisions in AMPT as well as with the results from experiments. The evolution of the magnetic field as a function of centrality and the background for the CME ($\langle \cos(\phi_\alpha + \phi_\beta - 2\Psi_{RP}) \rangle$) will be presented and compared with measurements from data.

List of tracks

QCD phase diagram (BES)

Author: Dr HAQUE, Rihan (Nikhef National institute for subatomic physics (NL))

Presenter: Dr HAQUE, Rihan (Nikhef National institute for subatomic physics (NL))

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