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Prediction for global properties in O+O collisions at $\sqrt{s_{NN}}$ = 7 TeV using AMPT model

Tuesday 17 May 2022 19:00 (1 hour)

Extensive studies at the Large Hadron Collider (LHC), CERN and Relativistic Heavy Ion Collider (RHIC), Brookhaven National Laboratory (BNL) on heavy-ion collisions such as Pb+Pb and Au+Au collisions have helped us understand the existence of Quark-Gluon Plasma (QGP) and study its properties in detail. Recent QGP-like signatures were observed in high-multiplicity proton+proton (pp) collisions. There has been intense research to understand the possible formation of QGP-droplets in small collision systems. However, to fill the gap between pp high-multiplicity and p+Pb collisions, small-ion collisions such as O+O collisions are anticipated in the upcoming run at the LHC. In such nuclear collisions, the nuclear charge density distribution inside the nucleus is a crucial parameter and affects almost every aspect of the outcomes. A three-parameter Fermi distribution (3pF) also known as the Woods-Saxon (WS) distribution is commonly used for heavier nuclei. However, for a doubly magic Oxygen nucleus, several studies replace the charge density profile from 3pF to be Harmonic-Oscillator (HO) type. In this work, we have implemented both of these density profiles in the 16O nucleus using a multiphase phase transport (AMPT) model. We report the results of global properties such as Bjorken energy density, squared speed of sound, particle ratios, kinetic freeze-out parameters and elliptic flow in O+O collisions at $\sqrt{s_{NN}}$ = 7 TeV from AMPT model for both WS and HO density profiles. This study would be a testimony for the studied global observables in O+O collisions with respect to a difference in the charge density profile when confronted with experimental observations from the LHC.

References: D Behera, N Mallick, S Tripathy, S Prasad, A N Mishra, R Sahoo, arXiv:2110.04016v1

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