

Study of Nuclear Modification Factor in O-O collisions at LHC energies using a transport model

Tuesday, June 4, 2024 8:03 PM (1 minute)

Extensive research at the Large Hadron Collider (LHC) and the Relativistic Heavy Ion Collider (RHIC) on Pb-Pb and Au-Au collisions have helped us develop and understand the properties of the quark-gluon plasma (QGP) in heavy-ion collisions. Recent investigation suggests that QGP-droplets may occur in small collision systems such as high-multiplicity pp collisions. O-O collisions are anticipated in the upcoming run at the LHC. This will provide an important and timely opportunity to investigate the effects seen in high-multiplicity pp and p-Pb collisions with a system having a similar number of participating nucleons and final-state multiplicity but with a larger geometrical transverse overlap, thereby enhancing jet-quenching effects, which depend on path length. In the current work, we have implemented both Woods-Saxon and an α -cluster tetrahedral structure in the oxygen nucleus using a multi-phase transport (AMPT) model. We report the nuclear modification factor (R_{AA}) for all charged hadrons and identified particles for most central, mid-central, and peripheral collisions in the O-O collisions at $\sqrt{s_{NN}} = 7$ TeV in the case of both Woods-Saxon and α -clustered density profiles. Additionally, we study the rapidity dependence of R_{AA} for all charged hadrons. We have also observed the behavior of R_{AA} with the same multiplicity environment between O-O and Pb-Pb collisions. A study like this will assist us in understanding the implications of nuclear density profiles and provide a realistic baseline measurement to compare experimental results in the future.

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Session Classification: Posters

Track Classification: Light-flavours and Strangeness