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Production of Heavy Flavour Decay Muons using Angantyr Model in PYTHIA8 at LHC energies

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In high energy nucleon-nucleon and heavy-ion (HI) collisions, the heavy quarks (charm and beauty) are produced at the very early stages of the collisions due to their large masses ($m_c \approx 1.29$ GeV/c^2 and $m_b \approx 4.19$ GeV/c^2). These heavy quark productions are mainly from hard parton-parton scattering with large momentum transfer (Q^2). The heavy quarks are produced much before the formation of the deconfined state of quarks and gluons called Quark-Gluon Plasma (QGP) at extremely high temperature and/or energy density in ultra-relativistic HI collision. After the production of heavy-quarks, they interact and pass through the QGP medium and hence experience a full evolution of the medium formed in HI collisions. Hence, the measurement of heavy quarks is very important probe to study the properties of QGP in HI collisions and provide a stringent test of perturbative QCD (pQCD) calculation over a wide range of transverse momentum (p_T). The measurement of heavy quarks in pp collisions serve as a baseline study for the same measurement in HI collisions.

After the discovery of the features of HI collisions such as ridge like effect and strangeness enhancement in high multiplicity pp events at LHC, the physics community started to look for any thermalised medium formation even in small colliding systems. Traditionally, any thermalised medium is not expected to be formed in small systems like proton-proton (pp) and proton-ion (pA) collisions. Here we would like to present the study of Heavy Flavour decay Muons (HFM) at forward rapidity ($2.5 < y < 4$) in pp and HI collisions using Angantyr model at LHC energies. Angantyr model is a HI model implemented in PYTHIA8 event generator. This model extrapolates the pp dynamics to the HI collisions and does not include any thermalised medium formation in heavy-ion collisions. In this work, we would like to present our simulation results of HFM productions using Angantyr model for various colliding systems such as pp, O-O, Xe-Xe and Pb-Pb and compared the results with the available published experimental data of ALICE. The results using Angantyr model could be served as the non-collective background to the observables sensitive to the collective behaviour.

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