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Longitudinal dependence of B and D mesons and heavy flavor leptons nuclear modification factor in relativistic heavy ion collisions

Summary

In order to study the structure and the properties of the quark gluon plasma, heavy quark probes are largely used as one of the important tomography tools. Therefore there has been a huge effort put on the study of these probes in the recent years. These studies have focused, for the most part, on mid-rapidity observables, however, longitudinal dependence of these observables may provide further insight on the dynamics of the medium due to the different production spectra and medium sizes at the forward and backward rapidity regimes. This work aims to explore these effects on the nuclear modification factor R_{AA} of B and D mesons, as well as heavy flavor leptons, in the rapidity range $-4.0 < y < 4.0$ by using a relativistic Langevin equation with gluon radiation coupled with the CLVisc (3+1)D viscous hydrodynamics medium background for AuAu at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV, PbPb at $\sqrt{s_{\mathrm{NN}}} = 2.76$ TeV and $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV collisions. We compare our results with current experimental data at mid rapidity and muons at forward rapidity. We also provide predictions for different rapidity ranges for B and D mesons observables.

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