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Jet-induced medium excitation in heavy-ion collisions

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The transport of jet shower partons and jet-induced medium excitations are investigated simultaneously within the coupled Linear Boltzmann Transport and hydro (CoLBT-hydro) model. In this coupled approach, the LBT model is coupled to 3+1D hydrodynamic model in real time with fluctuating initial conditions. The elastic collisions and radiation processes of energetic partons are simulated by LBT model with the background of the evolving bulk medium described by 3+1D hydrodynamic model. Energy and momentum of soft partons from LBT model are deposited into the medium via a source term in the 3+1D hydrodynamics. The hydro background for the LBT simulation is then updated for each time step. Using this CoLBT-hydro model, we simulate transport of gamma-jets and medium excitation in heavy-ion collisions. Hadron spectra from both the hadronization of jet shower partons and the medium excitation are calculated and compared to experimental data. Parton energy loss of jet shower partons leads to the suppression of hadron at large $z_T = p_T/E_T \gamma$ while medium excitations leads to enhancement of hadrons at small z_T . We further calculate gamma-hadron angular correlation which shows significant broadening for low $p_T < 2$ GeV hadrons.

Summary

The transport of jet shower partons and jet-induced medium excitations are investigated simultaneously within the coupled Linear Boltzmann Transport and hydro (CoLBT-hydro) model. In this coupled approach, the LBT model is coupled to 3+1D hydrodynamic model in real time with fluctuating initial conditions. The elastic collisions and radiation processes of energetic partons are simulated by LBT model with the background of the evolving bulk medium described by 3+1D hydrodynamic model. Energy and momentum of soft partons from LBT model are deposited into the medium via a source term in the 3+1D hydrodynamics. The hydro background for the LBT simulation is then updated for each time step. Using this CoLBT-hydro model, we simulate transport of gamma-jets and medium excitation in heavy-ion collisions. Hadron spectra from both the hadronization of jet shower partons and the medium excitation are calculated and compared to experimental data. Parton energy loss of jet shower partons leads to the suppression of hadron at large $z_T = p_T/E_T \gamma$ while medium excitations leads to enhancement of hadrons at small z_T . We further calculate gamma-hadron angular correlation which shows significant broadening for low $p_T < 2$ GeV hadrons.

Presentation type

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