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Electromagnetic Field Effects on Event-by-Event Simulations

The ultrarelativistic motion of charges in heavy-ion collisions is responsible for generating extreme electromagnetic fields, with magnetic fields of the order of 10^{18} G (for RHIC energies) [1]. However, the fields are very short-lived and their effects on the dynamics of the hot and dense matter produced in the collision are not well understood. In this work, we use a hybrid simulation chain, to investigate the effects that the electromagnetic field generated by the charged participants (and the currents induced by it) on the final state observables and on the hydrodynamic evolution itself. The initial conditions for the energy-momentum tensor and net electric charge 4-current are constructed using AMPT [2,3] and the evolution of the fluid is solved using a newly developed 3+1D hydrodynamic code. The effects of the magnetic field produced by the fluid are studied using a relativistic magnetohydrodynamics approach, neglecting any effects of the shear viscosity.

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Category

Theory

Collaboration (if applicable)

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