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Dissociation and recombination of charmonia within microscopic Langevin simulations

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The investigation of heavy quarkonia can give insight into processes that occur during the evolution of the quark-gluon plasma and therefore allow conclusions about the properties of the medium. One advantage of the theoretical approaches is that due to the large masses of the heavy quarks it is possible to describe them non-relativistically. We choose a classical model to describe charm and anticharm quarks as Brownian particles in the background medium of light quarks and gluons. The motion of the heavy quarks and the interaction with the medium are based on a Fokker-Planck equation, which can be realized with Langevin simulations, quantifying how position and momentum of the quarks change due to random kicks from the medium. The heavy quarks are able interact over a Coulomb-like screened potential to form bound states, which can later dissociate again due to interactions with the medium. Therefore dissociation and regeneration of charmonium states can be described. The medium evolution is parametrized by a transversally expanding, boost invariant fireball. Box simulations at fixed temperature and volume are used to verify that the system reaches the expected thermal distribution in the equilibrium limit and to test bound state properties. Within the fireball model, the initial momentum distribution of the pairs results from the PYTHIA event-generator and the elliptic flow of charm and anticharm quarks as well as of charmonia is studied at RHIC and at LHC energy.

session

F. Heavy Flavor and Quarkonia

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