Stony Brook University
The Graduate School

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Abstract

Charmonium in strongly-coupled quark-gluon plasma

By

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The heavy quark diffusion coefficient is the subject of a great deal of theoretical interest, with both phenomenology and AdS/CFT results pointing towards this transport coefficient being small in comparison to leading-order perturbative results. The heavy quark-antiquark bound state has been modeled with a Langevin equation that takes into account this small diffusion coefficient, as well as the interaction between the quarks in this pair. It was found that both the survival of J/psi particles in the most central collisions at the RHIC, and the thermalization of the relative abundances of charmonium states, can be explained with this model, where the destruction of quarkonium due to diffusion remains incomplete over the relevant timescales. Finally, this classical approach is replaced with a path integral which describes quarkonium as an open quantum system, so that comparisons can be made between this model and the results from lattice QCD simulations for certain quarkonium correlation functions.

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