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Effects of quarks on the formation and evolution of Z(3) walls and strings in relativistic heavy-ion collisions

We investigate the effects of explicit breaking of Z(3) symmetry due to the presence of dynamical quarks on the formation and evolution of Z(3) walls and associated QGP strings within Polyakov loop model. We carry out numerical simulations of the first order quark-hadron phase transition via bubble nucleation (which may be appropriate, for example, at finite baryon chemical potential) in the context of relativistic heavy-ion collision experiments. Using appropriate shifting of the order parameter in the Polyakov loop effective potential, we calculate the bubble profiles using bounce technique, for the true vacuum as well as for the metastable Z(3) vacua, and estimate the associated nucleation probabilities. These different bubbles are then nucleated and evolved and resulting formation and dynamics of Z(3) walls and QGP strings is studied. We discuss various implications of the existence of these Z(3) interfaces and the QGP strings, especially in view of the effects of the explicit breaking of the Z(3) symmetry on the formation and dynamical evolution of these objects.

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