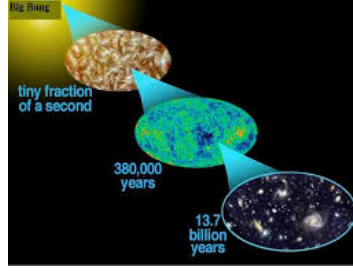


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Exploring axial U (1) restoration in a modified 2+1 flavor Polyakov quark meson model

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Exploring axial U (1) restoration in a modified 2+1 flavor Polyakov quark meson model

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Topic(s): Strongly-interacting matter at finite temperature

Abstract: We report on the U A (1) symmetry restoration resulting due to temperature dependence of the coefficient $c(T)$ for the Kobayashi-Maskawa-'t Hooft determinant (KMT) term in a modified 2+1 flavor Polyakov loop quark meson model having fermionic vacuum correction term (PQMVT). Temperature dependence of KMT coupling $c(T)$ drives the non-strange condensate melting to significantly smaller temperatures in comparison to the constant c case. Further due to $c(T)$, $m_{\eta 0}$ decreases from its vacuum value by 220 MeV near $T=176$ MeV after the chiral transition ($T_c \chi = 154.9$ MeV). This is similar to the $\eta 0$ in-medium mass drop of at least 200 MeV as reported by Csorgo and Vertesi in Ref [Csorgo, Vertesi], as an experimental signature of the effective restoration of U A (1) symmetry. The pseudoscalar mixing angle θ_p achieves anti-ideal mixing in the influence of $c(T)$. The η meson becomes light quark system (η_{NS}) at $T=176$ MeV and changes its identity with $\eta 0$ meson which becomes strange quark system (η_S). The degenerated temperature variations of σ, π meson masses merges with the temperature variations of the masses of degenerated $\eta 0, \eta$ mesons near 275 MeV. It means that for $c(T)$ when $m_\sigma = 400$ MeV, the U A (1) restoration takes place at $1.75 T_c \chi = 275$ MeV.

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