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Study of the Quark-Meson Model with Vector Mesons within Functional Renormalization Group

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In this work, we propose an effective action for the quark-meson model incorporating all (pseudo)scalar and (axial)vector mesons based on chiral symmetry. Within the framework of the functional renormalization group (FRG), we conduct a systematic study of the model. By deriving and solving the flow equation for the effective potential, we calculate the curvature masses of mesons at finite temperature (T) and chemical potential (μ). The observed degeneracy between chiral partners at high T and μ provides clear evidence for chiral symmetry restoration.

Using the method of analytic continuation, we compute the in-medium spectral functions of the ρ meson across different phases. These results establish a foundation for future investigations of dilepton production in hot and dense QCD matter.

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