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Pseudoscalar Screening Mass at Finite Temperature and Magnetic Field

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Understanding the screening mass of pseudoscalar mesons at finite temperature and magnetic field is crucial for comprehending the behavior of strongly interacting matter under extreme conditions, such as those found in the early universe or inside neutron stars. Additionally, in heavy ion collisions, strong magnetic fields are generated, which could significantly influence the properties of the quark-gluon plasma. The study of these screening masses provides insight into the modifications of mesonic properties in such environments, which is essential for the theoretical understanding of Quantum Chromodynamics (QCD) phase transitions and the properties of the quark-gluon plasma.

Here, we present continuum-extrapolated lattice QCD results on the screening mass of pseudoscalar mesons at finite temperatures and nonzero magnetic fields. The simulations used (2+1)-flavor lattice QCD simulations using physical quark masses employing the HISQ/tree action. The continuum extrapolation was carried using lattices having temporal extents $N_\tau = 8$, 12 and 16, all having aspect ratio $N_\sigma/N_\tau = 4$. The investigated temperature range is near the pseudocritical temperature, and the magnetic field ranges from 0 to 1 GeV^2. We discuss the dependence of the screening masses of various pseudoscalar mesons on temperature, magnetic field strength, and quark mass.

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