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Chiral dynamics in the low-temperature phase of QCD

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We investigate the low-temperature phase of strongly interacting matter and the crossover region with two light flavors of quarks in Lattice QCD. Based on Chiral Ward Identities we test the applicability of a fixed-temperature chiral expansion given that chiral symmetry is spontaneously broken. It indicates that a sharp real-time excitation persists with the quantum numbers of the pion consistently with Goldstone's theorem even at T=150 MeV. We determine the real part of the pole and its residue in the axial-charge density correlator at zero and finite momentum. The time-dependent correlators are also analyzed using the Maximum Entropy method and the Backus-Gilbert method yielding consistent results. In addition, we also test the predictions of ordinary chiral perturbation theory around the point (T=0, m=0) for the temperature dependence of static observables. Around the crossover region, we find that all quantities considered depend only mildly on the quark mass in the range 8 MeV <= overline{m}^{overline{MS}} <= 15 MeV}.

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