

Meson gas properties and chiral symmetry restoration

Thursday, 10 September 2015 16:40 (20 minutes)

I will discuss recent progress in low-energy QCD at finite temperature regarding chiral symmetry restoration and properties of meson gases relevant for Heavy-Ion Physics and lattice simulations. In particular, I will present a recent analysis of scalar and pseudo-scalar susceptibilities χ_S and χ_P^a , which allows to understand chiral partner degeneration at chiral symmetry restoration in a consistent framework built from model-independent assumptions. On the one hand, correlator identities confirmed by Chiral Perturbation Theory allow to relate χ_P^a and quark condensates for different channels in the light and strange sectors. On the other hand, such identities and the $O(4)$ S/P degeneration pattern are supported by direct analysis of lattice data for screening masses, quark condensates and scalar susceptibilities. The role played by the thermal $f_0(500)$ will be particularly emphasized. In fact, saturation of χ_S by the $f_0(500)$ state dynamically generated through thermal unitarization within ChPT, gives rise to a peak compatible with the lattice transition point, consistent with partner degeneration. I will also discuss resummation schemes such as large- N_f in which properties such as thermal unitarity and the thermal $f_0(500)$ pole behaviour hold exactly. Some recent progress on chiral symmetry properties in the presence of external magnetic fields could also be discussed.

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Session Classification: Session 10