

Dynamics of the eta-prime meson at finite temperature

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We investigate how the lifetime of the eta-prime changes in a thermal system. At high temperatures we expect an increase of the width due to interactions with particles from the heat bath (pions in our approximation). Already at $T=120$ MeV, the lifetime of the eta-prime seems to become comparable to that of a fireball created in heavy-ion collisions. This suggests that it could be possible to study how the eta-prime properties change close to the transition, where the spontaneously broken chiral symmetry of QCD is restored. The interest in the eta-prime is motivated by its deep connection to the $U(1)_A$ anomaly of QCD, whose behaviour at high temperatures is still unknown.

I will show results from my Master thesis project, obtained in the framework of Resonance Chiral theory [1] and I will compare them with last year results from C. Niblaeus' Master thesis [2] based on large- N_c Chiral Perturbation theory [3].

References

[1] G. Ecker, J. Gasser, A. Pich, and E. de Rafael, The Role of Resonances in Chiral Perturbation Theory, Nucl.Phys. B321, 311 (1989).

[2] C. Niblaeus, In-medium width of the eta-prime meson, Master Thesis. Uppsala (2013).

[3] S. Scherer, Introduction to chiral perturbation theory, Adv.Nucl.Phys. 27, 277 (2003).

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