

# Effect of the chiral phase transition on axion mass and self-coupling

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We compute the effect of the chiral phase transition of QCD on the axion mass and self-coupling; the coupling of the axion to the quarks at finite temperature is described within the Nambu–Jona-Lasinio model. We find that the axion mass decreases with temperature, following the response of the topological susceptibility, in agreement with previous results obtained within chiral perturbation theory at low and intermediate temperatures. As expected, the comparison with lattice data shows that chiral perturbation theory fails to reproduce the topological susceptibility around the chiral critical temperature, while the Nambu–Jona-Lasinio model offers a better qualitative agreement with these data, hence a more reliable estimate of the temperature dependence of the axion mass in the presence of a hot quark medium. We complete our study by computing the temperature dependence of the self-coupling of the axion, finding that this coupling decreases at and above the phase transition. The model used in our work as well as the results presented here pave the way to the computation of the in-medium effects of hot and/or dense quark-gluon plasma on the axion properties.

## Abstract Type

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