



High Energy Physics - Phenomenology

On critical scaling at the QCD $N_f=2$ chiral phase transition

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(Submitted on 14 Jun 2011)

We investigate the critical scaling of the quark propagator of $N_f=2$ QCD close to the chiral phase transition at finite temperature. We argue that it is mandatory to take into account the back-reaction effects of pions and the sigma onto the quark to observe critical behavior beyond mean field. On condition of self-consistency of the quark Dyson-Schwinger equation we extract the scaling behavior for the quark propagator analytically. Crucial in this respect is the correct pion dispersion relation when the critical temperature is approached from below. Our results are consistent with the known relations for the quark condensate and the pion decay constant from universality. We verify the analytical findings also numerically assuming the critical dispersion relation for the Goldstone bosons.

Comments: 9 pages, 6 figures

Subjects: **High Energy Physics - Phenomenology (hep-ph)**; High Energy Physics - Lattice (hep-lat); Nuclear Theory (nucl-th)

Cite as: [arXiv:1106.2700 \[hep-ph\]](#)
(or [arXiv:1106.2700v1 \[hep-ph\]](#) for this version)

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[v1] Tue, 14 Jun 2011 13:01:15 GMT (184kb)

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