High Energy Physics - Phenomenology

The QCD trace anomaly

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In this brief report we compare the predictions of a recent next-to-next-to-leading order hard-thermal-loop perturbation theory (HTLpt) calculation of the QCD trace anomaly to available lattice data. We focus on the trace anomaly scaled by T^2 in two cases: N_f=0 and N_f=3. When using the canonical value of mu = 2 pi T for the renormalization scale, we find that for Yang-Mills theory (N_f=0) agreement between HTLpt and lattice data for the T^2-scaled trace anomaly begins at temperatures on the order of 8 T_c while when including quarks (N_f=3) agreement begins already at temperatures above 2 T_c. In both cases we find that at very high temperatures the T^2-scaled trace anomaly increases with temperature in accordance with the predictions of HTLpt.

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