

NNLO pressure of cold quark matter: leading logarithm

Friday 12 October 2018 10:00 (1 hour)

At high baryon chemical potential μ , the pressure of QCD allows a weak-coupling expansion in the QCD coupling parameter α_s . The result is currently known up to and including the full NNLO α_s^2 , first computed in 1977 for massless quarks by Freedman and McLerran. Starting at this order, computations are complicated by the modification of particle propagation in a dense medium, which necessitates non-perturbative treatment of the so-called soft scale $\alpha_s^{(1/2)} \mu$. In this talk, I will describe a Hard-Thermal-Loop scheme for capturing the contributions of this scale to the weak-coupling expansion, and show how to use it to determine the leading-logarithm contribution at NNNLO: $\alpha_s^3 \ln(\alpha_s)^2$. This result is the first improvement to the pressure of massless cold quark matter in 40 years. I will also say a few words about current work being undertaken to expand this result to the subleading linear logarithm: $\alpha_s^3 \ln(\alpha_s)$.

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