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Pressure of cold quark matter: Next-to-leading logarithm

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Accurately understanding the thermodynamics of cold and dense deconfined quark matter plays an essential role in constraining the behavior of QCD matter inside the ultra-dense cores of neutron stars. Indeed, the past few years have witnessed promising steps towards completing the $\mathrm{N^3LO}$ term in the weak-coupling expansion of the cold and dense QCD pressure. In this talk, I will present the state-of-the-art result for the said quantity up to and including a new $\alpha_s^3 \ln \alpha_s$ term. This advancement has been made possible by the recently determined NLO hard-thermal-loop gluon self-energy, allowing the computation of the so-called mixed sector of the pressure arising from the interactions between long- and short-wavelength gluons. The new contribution decreases the uncertainty of the high-density pressure, and I will discuss its implications on the neutron-star equation of state.

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