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## 4D-TExS: A new 4D lattice-QCD equation of state with extended density coverage

*Thursday, 11 July 2024 15:20 (20 minutes)*

Although calculations of QCD thermodynamics from first-principle lattice simulations are limited to zero net-density due to the fermion sign problem, several methods have been developed to extend the equation of state (EoS) to finite values of the  $B$ ,  $Q$ ,  $S$  chemical potentials. Taylor expansion around  $\mu_i = 0$  ( $i = B, Q, S$ ) enables to cover with confidence the region up to  $\mu_i/T = 2.5$ . Recently, a new method has been developed to compute a 2D EoS in the  $(T, \mu_B)$  plane. It was constructed through a T-Expansion Scheme (TExS), based on a resummation of the Taylor expansion, and is trusted up to densities around  $\mu_B/T = 3.5$ . We present here the new 4D-TExS EoS, a generalization of the TExS to all 3 chemical potentials, offering a larger coverage than the 4D Taylor expansion EoS. After explaining the basics of the T-Expansion Scheme and how it is generalized to multiple dimensions, we will present results for thermodynamic observables as functions of temperature and all chemical potentials. This equation of state can be used to study the cosmological evolution around the QCD phase transition era.

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