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

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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, μ_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.

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