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QCD equation of state with improved precision from lattice simulations

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The equation of state of Quantum Chromodynamics has been in recent years the focus of intense effort from first principle methods, mostly lattice simulations, with particular interest to the finite baryon density regime. Because of the sign problem, various extrapolation methods have been used to reconstruct bulk properties of the theory up to as far as $\mu_B/T \simeq 3.5$. However, said efforts rely on the equation of state at vanishing baryon density as an integration constant, which up to $\mu_B/T \simeq 2 - 2.5$ proves to be the dominant source of uncertainty at the level of precision currently available. In this work we present the update of our equation of state at zero net baryon density from 2014, performing a continuum limit from lattices with $N_\tau = 8, 10, 12, 16$. We show how the improved precision is translated in a lower uncertainty on the extrapolated equation of state at finite chemical potential.

Category

Theory

Collaboration (if applicable)

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