

QCD Thermodynamics on the Lattice from the Gradient Flow

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Recently, we proposed a novel method to define and calculate the energy-momentum tensor (EMT) in lattice gauge theory on the basis of the Yang-Mills gradient flow. To calculate EMT in numerical lattice simulations is a nontrivial task due to the explicit breaking of the Poincaré invariance on the lattice. In this talk, we show the bulk thermodynamic quantities in lattice gauge theory using this method for quenched and (2+1)-flavor QCD. The entropy density and shear viscosity are directly calculated from the thermal average of the well-defined EMT and that correlation function. The results are consistent with the one by the other methods, and the statistical signal is much improved because of the smearing effect of the gradient flow.