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Equation of states and baryon number fluctuations in QCD within fRG approach

The equation of states i.e. the pressure and trace anomaly, and the baryon number fluctuations up to 6th orders have been calculated in the (2+1)-flavor QCD within the functional renormalization group (fRG) approach at finite temperature and densities. Starting from the gluon and quark degrees of freedom in perturbative high-energy regime, we systematically integrate-out quantum fluctuations towards low energies. Our results are in good agreement with the lattice QCD results. The fluctuations are also calculated at different collision energies with different freeze-out scenarios in heavy-ion collisions, and non-monotonic energy dependence of kurtosis is observed.

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