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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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