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Fluctuations and the QCD phase diagram from functional methods

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We summarise recent theoretical results on the QCD phase diagram and the properties of QCD's critical point based on a combination of lattice QCD and Dyson-Schwinger equations.
Using lattice input for the quenched gluon propagator, our approach correctly reproduced and predicted Nf=2+1 flavour lattice results for the quark condensate and the unquenched electric and magnetic gluon propagator at zero chemical potential. At chemical potential up to μ_B/T<3 our approach and extrapolations using lattice QCD both confirm an analytic crossover from the hadronic phase into the QGP. Beyond this region we see a critical end point at (T^c, μ_B^c)=(120,500) MeV, which is neither very sensitive to additional charm quark contributions nor to corrections from virtual baryons.
We furthermore present new results for baron number fluctuations. We discuss the changes of ratios of fluctuations up to fourth order along and below the transition line for temperatures and baryon chemical potential up to and beyond the critical end point. Comparing with preliminary STAR data for the skewness and kurtosis ratios, our results are compatible with the scenario of a critical end point at large chemical potential and slightly offset from the freeze-out line.
We also discuss the caveats involved in this comparison.

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