

# Color path integral equation of state of the quark-gluon plasma at nonzero chemical potential

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**Abstract.** Based on the constituent quasiparticle model of the quark-gluon plasma (QGP), a color quantum path-integral Monte-Carlo (PIMC) method for calculation of thermodynamic properties of the QGP is developed. We show that the PIMC method can be used for calculations of the equation of state at zero and non-zero baryon chemical potential not only above but also below the QCD critical temperature. Our results agree well with lattice QCD calculations based on a Taylor expansion around zero baryon chemical potential. In our approach the QGP partition function is presented in the form of a color path integral with a relativistic measure replacing the Gaussian one traditionally used in the Feynman-Wiener path integrals. A procedure of sampling color variables according to the SU(3) group Haar measure is used for integration over the color variables. We expect that this approach will be useful to predict additional properties of the QGP that are still inaccessible in lattice QCD.