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Color quantum simulations of strongly coupled quark-gluon plasma VLADIMIR FILINOV[1], VLADIMIR FORTOV, Joint Instute for High Temperatures RAS, Moscow, Russia, MISHAEL BONITZ, Institute for Theoretical Physics and Astrophysics, Kiel, Germany, YURII IVANOV, GSI Helmholtzzentrum fur Schwerionenforschung GmbH, Darmstadt, Germany, PAVEL LEVASHOV, Joint Instute for High Temperatures RAS, Moscow, Russia — We propose stochastic simulation of thermodynamics and kinetic properties for quark-gluon plasma (QGP) in semi-classical approximation in the wide region of temperature, density and quasi-particles masses. In grand canonical ensemble for finite and zero baryon chemical potential we use the direct quantum path integral Monte Carlo method (PIMC) developed for finite temperature within Feynman formulation of quantum mechanics to do calculations of internal energy, pressure and pair correlation functions. The QGP quasi-particles representing dressed quarks, antiquarks and gluons interact via color quantum Kelbg pseudopotential rigorously derived for Coulomb particles. This method has been successfully applied to strongly coupled electrodynamic plasmas (EMP). A strongly correlated behavior of the QGP is expected to show up in long-ranged spatial correlations of quarks and gluons which, in fact, may give rise to liquid-like and, possibly, solid-like structures. We have done already the first calculation of the QGP equation of state, spatial and color pair distribution functions, diffusion coefficients and shear viscosity.

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