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The Quark Gluon Plasma as a Dynamical Quasi-Particle Medium

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The thermodynamic properties of the quark gluon plasma (QGP) - as produced in relativistic nucleus-nucleus collisions –is well determined within lattice QCD calculations at vanishing quark chemical potential [1]. However, the QGP equation of state needs to be interpreted in terms of effective degrees of freedom (d.o.f). Considering the QGP as a dynamical quasi-particle medium of massive off-shell particles (as described by the dynamical quasi-particles model "DQPM"[2]), we reproduce the lQCD results at finite temperature and chemical potential including the speed of sound. Moreover, we simultaneously describe the quark number density and susceptibility. Within our study, we determine the momentum, temperature and chemical potential dependencies of the QGP d.o.f. within the dynamical quasi-particle model [3].

In the same approach, we compute the transport properties (shear and bulk viscosities, electric and heat conductivities, etc) of the QGP at finite temperature and chemical potential. The cross sections at finite temperature and chemical potential, used in our study, are evaluated for these dynamical quasi-particles using the leading order Born diagrams [4]. We, furthermore, provide a comprehensive comparison between perturbative and non-perturbative QCD based models on the determination of the QGP transport coefficients [5].

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On behalf of collaboration:

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