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CORRIGENDUM

The quark–gluon plasma liquid

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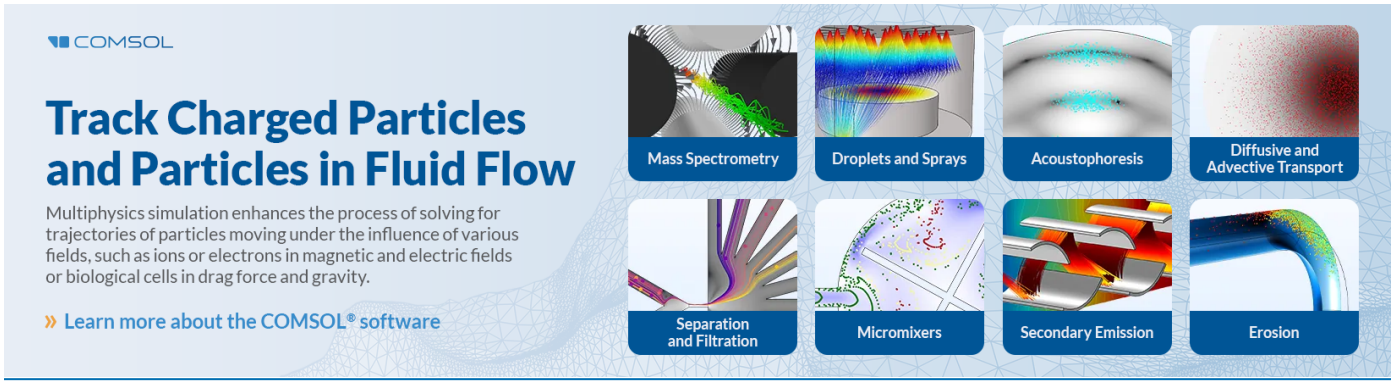

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The estimate of the Coulomb coupling parameter Γ contains an error. In QCD, where Heavyside–Lorentz units are used, the Coulomb potential has to be divided by a factor of 4π compared to CGS units [1]. Hence the correct Coulomb coupling parameter reads $\Gamma = Cg^2/(4\pi dT)$. Taking into account the magnetic interaction, which is of the same magnitude as the electric interaction in an ultrarelativistic plasma, the coupling parameter is reduced by about a factor of 6. Consequently we obtain $\Gamma = 1.5$–5 in a QGP at $T \simeq 200$ MeV. Such a value still indicates that the QGP is in the liquid phase. However, the phase transition to the gas phase, assumed to happen at $\Gamma_c \simeq 1$, takes place now at a few times of the transition temperature from the hadronic phase to the QGP. Hence it might be possible that the gas–liquid transition occurs during the expansion of the fireball in nucleus–nucleus collisions at LHC [2]. The phase transition from the QGP liquid to the QGP gas expands the phase diagram of strongly interacting matter to high temperatures. This phase transition ends at a critical point, above which a supercritical fluid exists.

The estimate of the cross section enhancement is also affected by the above error. The Coulomb radius should also be divided by a factor of 6, leading to $\rho = 0.2$–1 fm. Then $\beta = \rho/\lambda_D = 1$–$5$ which gives a maximum impact parameter of $(1.4$–$3.3)\lambda_D$, from which, using equation (2), a cross section enhancement of a factor of 2 to 9 results.

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References

[1] Jackson J D 1975 *Classical Electrodynamics* (New York: Wiley)
[2] Peshier A 2005 private communication

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