

High Energy Physics – Phenomenology

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The SUSY Yang–Mills plasma in a T –matrix approach

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The thermodynamic properties of $\mathcal{N} = 1$ supersymmetric Yang–Mills theory with an arbitrary gauge group are investigated. In the confined range, we show that identifying the bound state spectrum with a Hagedorn one coming from non–critical closed superstring theory leads to a prediction for the value of the deconfining temperature T_c that agrees with recent lattice data. The deconfined phase is studied by resorting to a T –matrix formulation of statistical mechanics in which the medium under study is seen as a gas of quasiglasons and quasigluinos interacting nonperturbatively. Emphasis is put on the temperature range $(1-5)\sim T_c$, where the interaction are expected to be strong enough to generate bound states. Binary bound states of gluons and gluinos are indeed found to be bound up to $1.4 T_c$ for any gauge group. The equation of state is then computed numerically for $SU(N)$ and G_2 , and discussed in the case of an arbitrary gauge group. It is found to be nearly independent of the gauge group and very close to that of non–supersymmetric Yang–Mills when normalized to the Stefan–Boltzmann pressure and expressed as a function of T/T_c .

Comments: The main conclusions of our previous versions are unchanged. This version is improved and is a fusion of our papers [arXiv:1408.0958v2](#) and [arXiv:1408.4979](#)
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