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 quasigluons and quasigluinos interacting nonperturbatively. Emphasis is put on the temperature range (1-5)~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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