Abstract Submitted
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Deconfinement of gauge theories KEN HUAI-CHE YEH, University of British Columbia — It is known that the large N gauge theories with SU(N) symmetry on the sphere undergo the phase transition, and color singlets are deconfined at high temperature. The ordinary ungauged partition function is represented by the singlet gauged partition function, $Z_{singlet}$. We examine whether the singlet constraint at the deconfinement phase was a physical consequence. A model of multiple matrices harmonic oscillators is considered as a toy model of the large N, 4D SU(N) gauge theory. We compare $Z_{singlet}$ to the known partition function of a group of non- interacting harmonic oscillators, which represent the model without imposing the singlet constraint. To calculate $Z_{singlet}$, we change the integration variables of group elements to eigenvalues, and the integral becomes a 1D many body system of particles with pairwise interaction. We compute the equilibrium distribution and the free energy. We assure that the eigenvalues are frozen at the saddle point at high temperature. However $Z_{singlet}$ has the free energy converging to $(m-1)N^2\ln(1-q)$ while the free energy of harmonic oscillators is $mN^2\ln(1-q)$. Changing the integration variables from group elements to eigenvalues explains the discrepancy of the free energy between imposing and relaxing the single constraint. Gauge theory cannot simply relax the singlet constraint at high temperature without adding a normalization factor.

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