On the deconfinement limit in (2+1)-dimensional Yang-Mills theory

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In the workshop, I gave a talk based on a recent paper [ArXiv:0804.3125v2] which studies the deconfining limit in (2+1)-dimensional Yang-Mills theory. The analysis follows a pioneering work on the Hamiltonian approach for the same theory initiated by Karabali, Kim and Nair. We first review this so-called KKN approach on $\mathbf{R}^3$. We briefly review its main important results which include:

- derivations of the gauge-invariant measure by use of matrix parametrization;
- evaluation of vacuum wavefunction;
- calculation of the vacuum expectation value for the Wilson loop operator; and
- numerical evaluation of the string tension.

We then extend the KKN approach to the spacetime on $S^1 \times S^1 \times \mathbf{R}$, so that we can discuss the theory at finite temperature by taking the limit of $S^1 \to \mathbf{R}$ for one of the S^1's. As in the planar case, we consider the matrix parametrization of gauge potentials on a torus, taking account of zero mode contributions due to the topological change. We then utilize the results of KKN approach, ending up with calculation of the string tension for the toric case.

The deconfinement limit can be discussed when the string tension vanishes. This leads to an estimation of deconfinement temperature. The result agrees with a propagator mass for gluons which has been derived in the KKN approach.