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Critical behavior of SU(3) lattice gauge theory with 12 light flavors

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It is expected that when the number of light flavors of QCD-like theories is increased beyond some critical value, a transition having some Kosterlitz-Thouless features occurs. We report numerical results for a four-dimensional
SU(3) lattice gauge theory with 12 flavors of unimproved staggered fermions. We show that the scaling of the imaginary part of the zeros of the partition function in the complex coupling plane is consistent with a first order phase transition
for small values of the mass. We report searches for the endpoint of the line of first order phase transition in the mass-coupling plane.
A light and weakly interacting scalar is expected near this endpoint. We present recent calculations of the second-order Renyi entanglement entropy for the
two-dimensional O(2) model and show that it allows to delimit the Kosterlitz-Thouless phase in the chemical potential-coupling plane.
We discuss the possibility of calculating this quantity for gauge theories with fermions.

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