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Topology and glueballs in $SU(7)$ Yang-Mills with open boundary conditions

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It is well known that the topology of gauge configurations generated in a Markov Monte-Carlo chain freezes as the continuum limit is approached. The corresponding autocorrelation time increases exponentially with the inverse lattice spacing, affecting the ergodicity of the simulation. In SU(N) gauge theories for large N this problem sets in at much coarser lattice spacings than for N=3. This means that its systematics can be studied on lattices that are smaller in terms of the number of lattice sites. It has been shown that using open boundary conditions in time allows instantons to be created and destroyed, restoring topological mobility and ergodicity.
However, with open boundary conditions translational invariance is lost and the influence of spurious states propagating from the boundary into the bulk on physical correlators needs to be carefully evaluated. Moreover, while the total topological charge can be changed, the mobility of instantons across the lattice is still reduced. We consider SU(7) Yang-Mills theory and analyse its topological content in the periodic and open boundary condition cases. We also investigate scalar and pseudoscalar glueball correlation functions.

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