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Propagators for a SU(3) Gauge Theory on the Lattice

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Gauge symmetries are pervasive in particle physics, guiding the formulation of all interactions within the Standard Model. Usual methods for the calculation of processes, observables and properties of particles rely on perturbative expansions, which fail to converge for non-abelian gauge theories in the low-energy regime. The lattice formulation of a gauge theory, inherently non-perturbative, provides an alternative for these methods. In it the Lorentz symmetries are broken before taking the limit to the continuum because of the space-time discretization implemented by the lattice (in which the spacing between sites acts as an ultraviolet regulator making the theory finite), but gauge symmetry is kept exact at all steps. Moreover, one works in Euclidean spacetime, which allows one to use tools from Statistical Mechanics. We present the formulation for SU(3) gauge theory on the lattice and some preliminary results for the gluon and quark propagators.

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