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E9: Lattice artefacts on the Landau gauge gluon propagator from hypercubic tensor representations

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Lattice tensor representations are used to investigate the lattice Landau gauge gluon propagator for the 4-dimensional, pure SU(3) Yang-Mills gauge theory.

Due to the different symmetry structure of hypercubic lattices compared to the continuum space-time, lattice correlation functions are described by different tensor structures. Therefore, form factors describing lattice correlation functions have, in principle, non-trivial relations with the continuum counterparts. The use of several tensor bases respecting lattice symmetries, and the analysis of its completeness allows to quantify the deviations of the lattice results from the continuum theory due to the lattice artefacts, and also estimate the theoretical uncertainty in the propagator. Furthermore, our analysis tests continuum based relations with the lattice data and shows that the lattice Landau gauge gluon propagator is suitably described by a unique form factor, as in the continuum formulation.

Additionally, we identified classes of kinematic configurations where these deviations are minimal and the continuum description of lattice tensors is improved.

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