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Towards glueball scattering in lattice Yang-Mills theory

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We present progress in the determination of glueball masses and scattering parameters computed using lattice $SU(3)$ Yang-Mills theory. Focusing on the vacuum-quantum-number ($J^{PC} = 0^{++}$) sector, the computation makes use of a number of techniques to improve the extraction of energies from Euclidean correlators, including anisotropic lattices, the multi-level algorithm, and a large set of operators applied in a variational method. In addition to various algorithmic considerations, our main result is a volume-dependent extraction of the ground state energy. This enables a prediction of the mass in the infinite volume limit and the trilinear coupling governing the coefficient of the leading volume-dependent exponential. This result is a first step towards using excited finite-volume states to extract the glueball scattering amplitude, with potential applications in QCD and strongly interacting dark matter models.

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