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Extracting the eta-prime meson mass from gluonic correlators in lattice QCD

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Calculation of the eta-prime mass is a notoriously difficult problem, as it requires evaluation of the disconnected diagram which is costly and noisy. In this work, we use a gluonic operator to extract the eta-prime state after smearing the link variables through the Wilson flow. With this choice, one can avoid a large cancellation of pion contribution between the connected and disconnected diagrams. We obtain the eta-prime meson mass on lattices with three different lattice spacings and two physical volumes, which allow us to estimate its continuum and large volume limits.

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