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Contrasting low-mode noise reduction techniques for light HISQ meson propagators

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The dominant contribution to the long distance region of any meson correlation function comes from the quark propagator's eigenmodes with the smallest eigenvalues. As precision demands for this region increase, methods that offer an exact determination of these low modes have become widely adopted as an effective tool for noise reduction. This work explores the effect of exact low modes on noise reduction for all-to-all as well as traditional wall-to-all propagator techniques. We focus on the connected light quark vector current two-point correlation function, a key observable for the hadronic vacuum polarization contribution to the muon's anomalous magnetic moment. For this analysis we use MILC's 2+1+1 Highly Improved Staggered Quark (HISQ) ensembles at lattice spacings as small as ~ 0.06 fm at physical mass.

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