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Lattice QCD calculation of pion pole's contribution to HLbL

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In this study we develop a novel method for computing the pion pole's contribution to hadronic light-by-light in the absence of a parametrization of the pion transition form factor. By introducing a pion structure function and performing the gegenbauer expansion, we demonstrate that the majority of the pion pole's contribution can be extracted in a model-independent manner.

The calculation is carried out using five ensembles generated with 2+1 flavor domain wall fermions at the physical pion mass. After performing a continuum extrapolation and analyzing systematic effects, we obtain the final result $a_{\mu}^{\pi^0\text{-pole}} = (58.3 \pm 2.3) \times 10^{-11}$.

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