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Pion and Kaon Distribution Amplitudes in the Continuum Limit
CARSON HONKALA, RUI ZHANG, HUEY-WEN LIN, Michigan State University, JIUNN-WEI CHEN, National Taiwan University — We present a lattice-QCD calculation of the pion, kaon and η_s distribution amplitudes using large-momentum effective theory (LaMET). Our calculation is carried out using three ensembles with 2+1+1 flavors of highly improved staggered quarks (HISQ), generated by MILC collaboration, at 310-MeV pion mass with 0.06, 0.09 and 0.12 fm lattice spacings. We use clover fermion action for the valence quarks and tune the quark mass to match the lightest light and strange masses in the sea. The resulting lattice matrix elements are nonperturbatively renormalized in regularization-independent momentum-subtraction (RI/MOM) scheme and extrapolated to the continuum. We use two approaches to extract the x-dependence of the meson distribution amplitudes: 1) we fit the renormalized matrix elements in coordinate space to an assumed distribution form through a one-loop matching kernel; 2) we use a machine-learning algorithm trained on pseudo lattice-QCD data to make predictions on the lattice data. We found the results are consistent between these methods with the latter method giving a less smooth shape. Both approaches suggest that as the quark mass increases, the distribution amplitude becomes narrower. Our pion distribution amplitude has broader distribution than predicted by light-front constituent-quark model, and the moments of our pion distributions agree with previous lattice-QCD results using the operator production expansion.

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