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First Glimpse into the Kaon Gluon Parton Distribution Using Lattice QCD

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In this work, we present the first results on the gluon parton distribution of the kaon from lattice quantum chromodynamics.
We carry out the lattice calculation at pion mass around 310~MeV and two lattice spacings, 0.15 and 0.12~fm, using $2+1+1$-flavor HISQ ensembles generated by MILC Collaboration. The kaon correlators are calculated using clover fermions and momentum-smearing sources with maximum boost momentum around 2~GeV and high statistics (up to 324,000 measurements). We study the dependence of the resulting reduced Ioffe-time pseudo-distributions at multiple boost momenta and lattice spacings. We then extract the kaon gluon distribution function in the $\overline{\text{MS}}$ scheme at $\mu = 2$~GeV, neglecting the mixing between the gluon and singlet-quark sectors. Our results at the smaller lattice spacing are consistent with phenomenological determinations.

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