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Exploring Gluon Momentum Fraction in Mesons through Lattice Quantum Chromodynamics Simulations

We compute the quark and gluon momentum fraction for the pion and kaon. This is done by employing lattice quantum chromodynamics simulations. We use three gauge ensembles of twisted mass fermions generated by the Extended Twisted Mass Collaboration with two degenerate light quarks and non-degenerate strange and charm quarks. All quark masses are tuned to approximately their physical values. Stout smearing is used on the gluon loops to reduce ultra violet gauge noise. We use these three gauge ensembles with lattice spacings a = 0.08 fm, 0.068 fm and 0.57 fm to take, for the first time, the continuum directly at physical pion mass. Renormalisation factors are computed non-perturbatively within the RI'scheme for the quark and gluon operators. Mixing between the quark and gluon is taken into account perturbatively. We check the momentum sum in the continuum limit.

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