

# Two-current Correlations and the Pion Valence Quark Distribution from Lattice QCD

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An understanding of the partonic structure of hadrons is an essential ingredient in making precise predictions and measurements of hadronic cross-sections and various Standard, and Beyond Standard, Model parameters. Several encouraging proposals have been developed in the past decade that relate lattice calculable quantities with PDFs via frameworks akin to QCD factorization. We report results of one such LQCD formalism, wherein the pion valence quark distribution is extracted through a short-distance collinear factorization of space-like separated vector and axial-vector current correlations. A simultaneous fit of such matrix elements computed on four distinct gauge ensembles, including systematic lattice corrections, yields a physical Ioffe-time distribution (ITD). The pion valence PDF extracted from this ITD is found to be consistent with experiment across the entire Bjorken- $x$  region, and offers tantalizing clues to its large- $x$  behavior. We further demonstrate the recently derived one-loop matching coefficient that is central to this work has a well-controlled behavior in Ioffe-time.

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