

Parton Distribution Function Calculation of the Pion on a Fine Lattice

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We present numerical results on the bare quasi-PDF matrix element for the pion. Our pion mass is 300 MeV using a HISQ sea and Wilson-Clover valence quarks. Our lattice spacing and volume are 0.061 fm and $48^3 \times 64$ respectively. Large momentum calculations being necessary for reliable matching between the quasi-PDF and the light-cone PDF using LaMET, we evaluate our matrix elements for a pion with momentum 1.69(2.11) GeV, or 4(5) units on the lattice. Large momentum calculations on the lattice are notoriously contaminated with unwanted excited state contributions overlapping to our measurement. As such we also present a detailed study of pion two-point functions at large momentum, tuned using a multitude of smearing techniques to reduce the overlap of our operators to excited states. Furthermore we HYP-smear the Wilson Line of our quasi-PDF matrix element to study the reduction of lattice artifacts in our calculation. Ioffe-Time distribution functions were also computed as an exploratory study.

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