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Sketching the pion's valence-quark Generalised Parton Distribution

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In order to learn effectively from measurements of Generalised Parton Distributions (GPDs), it is desirable to compute them using a framework that can potentially connect empirical information with basic features of the Standard Model. We sketch an approach to such computations, based upon a rainbow-ladder (RL) truncation of QCD's Dyson-Schwinger equations and exemplified via the pion's valence dressed-quark GPD. Our analysis focuses primarily on vanishing skewness, although we also capitalise on the symmetry-preserving nature of the RL truncation by connecting the considered pion GPD with the pion's valence-quark parton Distribution Amplitude. We explain that the impulse-approximation used hitherto to define the pion's valence dressed-quark GPD is generally invalid owing to omission of contributions from the gluons which bind dressed-quarks into the pion. A simple correction enables us to identify a practicable improvement to the approximation for the pion GPD at vanishing skewness, expressed as the Radon transform of a single amplitude. Therewith we obtain results for the associated impact-parameter dependent distribution, which provides a qualitatively sound picture of the pion's dressed-quark structure at an hadronic scale. We evolve the distributions to the scale 2\,GeV, so as to facilitate comparisons in future with results from experiment or other nonperturbative methods.

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