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Lightcone and quasi distribution amplitudes for light octet and decuplet baryons

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We present a comprehensive investigation of leading-twist lightcone distribution amplitudes (LCDAs) and quasi distribution amplitudes (quasi-DAs) for light octet and decuplet baryons within large momentum effective theory. In LaMET, LCDAs can be factorized in terms of a hard kernel and quasi-DAs that are defined as spatial correlators and calculable on Lattice QCD.
To renormalize quasi-DAs and eliminate the singular terms $\ln(\mu^2 z_i^2)'s$ in them, which undermine the efficacy in perturbative expansion, we adopt a hybrid renormalization scheme that combines the self-renormalization and ratio scheme. Through self-renormalization, we eliminate UV divergences and linear divergences at large spatial separations in quasi distribution amplitudes without introducing additional nonperturbative effects. By taking a ratio with respect to the zero-momentum matrix element, we effectively remove UV divergences at small spatial separations.
Under the hybrid renormalization scheme, we calculate the hard kernels up to one-loop accuracy. It turns out that only four different hard kernels are needed for all leading-twist LCDAs of octet and decuplet baryons. These results are crucial for the lattice-based exploration of the LCDAs of a light baryon from the first principle of QCD.

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