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Renormalization of three-quark operators for baryon distribution amplitudes

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Octet baryon distribution amplitudes are non-perturbative objects of phenomenological interest parametrizing the momentum distribution within the corresponding Fock states. Their normalization and their moments can be calculated using lattice QCD, and such results require renormalization. However, the MS-bar scheme, i.e., the renormalization scheme used in phenomenological applications, necessitates a perturbative approach in non-integer spacetime dimension and is therefore not well suited for lattice calculations. Instead, we renormalize the lattice results non-perturbatively in a RI'/SMOM scheme and carry out the conversion to the MS-bar scheme in continuum perturbation theory. Using group theoretical and symmetry considerations we have constructed optimized three-quark operator bases for the renormalization procedure in order to minimize mixing.

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