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Finite- t and target mass corrections for the short-distance expansion of quasi- GPDs

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We calculate the “kinematic” corrections t/P_z^2 and m_N^2/P_z^2 to the short distance expansion of gauge-invariant nonlocal quark-antiquark operators sandwiched between nucleon states with different momenta. Here t is the momentum transfer, m_N is the nucleon mass and P_z is the momentum component in the direction of the quark-antiquark separation, which is assumed to be large.

These matrix elements can be calculated in lattice QCD and, at leading twist, expressed in terms of moments of the generalized parton distributions (GPDs). Our results allow one to control one of principal uncertainties in such calculations and extend their region of applicability to larger momentum transfers, which is important in the quest to access the three-dimension image of the proton.

The calculated corrections turn out to be significant for a realistic lattice QCD setup.

Primary authors: Prof. BRAUN, Vladimir (University of Regensburg); Dr JIANG, Hua-Yu (Henan Normal University)

Presenter: Prof. BRAUN, Vladimir (University of Regensburg)

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