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Towards lattice calculations of double parton distributions

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In a factorization approach to double parton scattering, the initial state is described by double parton distributions (DPDs). These functions are currently poorly constrained by experiment, but provide a view on interesting correlations between partons in the hadron. We show that DPDs can be calculated from first principles using lattice QCD via the quasi-PDF approach, opening up a new way to constrain these distributions. Specifically, we argue that there exists a factorization formula between the physical lightcone-DPDs and the lattice calculable quasi-DPDs that is governed by a perturbative matching kernel and calculate the matching kernel at one-loop. We verify the perturbative nature of the matching kernel at one-loop order by showing that the lightcone- and quasi-DPDs share the same infrared behaviour and that the matching kernel is free of logarithms involving infrared energy scales.

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