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Quantum Computing Hadron fragmentation functions in Light-front Chromodynamics

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Abstract

We deploy Quantum Chromodynamics (QCD) in Light-Front Gauge, discretized and cut-off in Fock- and momentum-spaces with a particle-register encoding suited for quantum computers and show for the first time how to calculate fragmentation functions, a problem heretofore untractable in general from ab-initio approaches. We provide a classical-simulator based proof of concept by computing the charm-to-charmonium cto J/psi fragmentation, an interesting case where we can (reasonably) compare with the known 1993 perturbative evaluation within NonRelativistic QCD.

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