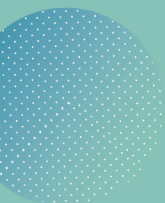




INSTITUTO DE FÍSICA
DE PARTÍCULAS Y DEL COSMOS

IPARCOS



Preprint Series in Particles and Cosmos Physics

n° IPARCOS-UCM-26-043

First-principle predictions of fragmentation functions via quantum computing

by J. J. Gálvez Viruet, et al. (including F. J. Llanes-Estrada)

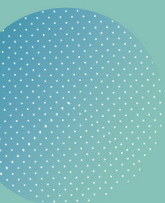
September 2026

Plaza de las Ciencias, 1 28040 Madrid, Spain

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Abstract

We report on an algorithm to compute fragmentation functions from the first principles Quantum Chromodynamics (QCD) Hamiltonian quantized in Light-Front Gauge, opening a path for digital quantum computers to calculate these longitudinal jet-structure observables. Simulating the behaviour of such computers on a classical cluster (which is memory-limited to about 30 qubits, given the expansive Hilbert spaces of actual quantum computers), we run a demonstration of a heavy-quark leading parton fragmenting into quarkonium, which we benchmark against NRQCD computations. Future quantum computers, perhaps concurrently running with HL-LHC, would have ample opportunity to extract arbitrary parton-hadron combinations.

