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Quarkonium Fragmentation Functions from Heavy-Flavor Non-Relativistic Evolution

Based on the theoretical framework of Non-Relativistic QCD (NRQCD), we study the hadroproduction of the pseudoscalar heavy quarkonia, η_c and η_b mesons, at moderate-to-large transverse momenta. Relying on the single-parton collinear fragmentation mechanism within a variable-flavor number scheme, we use NRQCD to describe the formation of the heavy quark bound state at the initial scale at NLO. To this extent, we release the first public fragmentation function sets for heavy-quarkonium species, NRFF1.0. In order to access the DGLAP evolution threshold for all partonic channels we make use of Heavy-Flavor NonRelativistic evolution (HF-NRevo) scheme. This setup suits well for theoretical developments such as the study of vector states through J/ψ and Υ and the extension of HF-NRevo to quarkonium-in-jet fragmentation, enabling the study of jet substructure via quarkonium-modulated angularities and resummation-sensitive observables. Phenomenologically, this framework has many applications, including the study of exotic states, the exploration of intrinsic charm, the matching with TMDs Fragmentation Functions and the investigation of heavy-flavor fragmentation function modulations in hot Quark-Gluon Plasma.

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