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## The revised TMD shape function in SIDIS

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Quarkonia are very important tools to probe gluon transverse momentum dependent (TMD) distributions at lower energies as compared, for instance, to Higgs production. Among them, the  $\Upsilon/\Upsilon'$  meson is one of the most studied, since it frequently decays into lepton pairs, making its detection easier with respect to other quarkonia. Thus, describing observables that involve  $\Upsilon/\Upsilon'$  production within a proper theoretical formalism is highly valuable.

Adopting the non-relativistic QCD approach, the proper evaluation of these observables at low transverse momentum is achieved by combining the TMD distribution(s) for the initial state(s) and the TMD shape function for the final state. The latter is a generalisation of the quarkonium long-distance matrix elements, which includes smearing effects.

In this talk, I will discuss the derivation of the TMD shape functions for semi-inclusive deep-inelastic scattering. I will then propose a new TMD factorized formula and a procedure to extract these new universal functions, taking into account their evolution with respect to the factorisation scale. The phenomenological studies presented in this talk could be performed at the future Electron-Ion Collider.

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