

# Progresses on the TMD shape function in SIDIS

*Friday, May 26, 2023 11:50 AM (20 minutes)*

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  $J/\psi$  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  $J/\psi$  production within a proper theoretical formalism is highly valuable.

Adopting the non-relativistic QCD approach, the evaluation of these observables at low transverse momentum is achieved by combining the TMD distribution(s) for the initial state(s) and the long-distance matrix elements for the  $J/\psi$  meson in the final state. However, it has been shown that the correct TMD factorisation requires a generalisation of the latter, the so-called TMD shape functions, which include smearing effects. Observables are then written in terms of TMD parton distribution(s) and shape functions, assuming both colour-singlet and colour-octet production mechanisms for the  $J/\psi$  meson.

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.

**Primary author:** MAXIA, L. (University of Groningen)

**Presenter:** MAXIA, L. (University of Groningen)

**Session Classification:** TMDs