

Inclusive J/ψ production as a probe of gluon dynamics at NICA

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Inclusive J/ψ production in proton–proton collisions at $\sqrt{s} = 27$ GeV provides a valuable opportunity to investigate gluon dynamics in the moderate- x region accessible at the Spin Physics Detector (SPD) of the Nuclotron-based Ion Collider fAcility (NICA). In this work, we present a phenomenological study of quarkonium production near the kinematic threshold within the transverse-momentum-dependent (TMD) framework using the PEGASUS event generator.

Predictions are obtained with gluon TMD distributions based on the KMR and CCFM evolution schemes, allowing a systematic comparison of their effects on differential observables. Rapidity and transverse-momentum distributions are analyzed together with the dependence of the cross sections on the renormalization scale. In addition, normalized transverse-momentum spectra are investigated to isolate shape differences originating from gluon transverse-momentum broadening. The relative contributions of the color-singlet and color-octet production mechanisms are also examined in the SPD kinematic region.

The obtained results demonstrate that inclusive J/ψ production at NICA energies is sensitive to the underlying gluon transverse structure and therefore represents a promising probe of TMD dynamics in the moderate-energy regime. The presented predictions provide theoretical benchmarks for forthcoming measurements at SPD/NICA.