

# Prediction of $J/\psi$ , $\phi$ and $D$ mesons production in the NICA energy range: Self-similarity approach

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The SPD (Spin Physics Detector) experiment is 1 of the 2 installations of NICA (Nuclotron-based Ion Collider fAcility) that is under construction at the Joint Institute for Nuclear Research, Dubna. It is expected that the SPD setup will provide physics runs after 2025. The  $J/\psi$  production in hadron collisions is of great interest for several reasons. The description of the process is a challenge and an important test for our understanding of the quantum chromodynamics. Particles containing strange and charm quarks are important probes of the excited medium created in heavy ion collisions. Also,  $J/\psi$  production, being sensitive to the gluon content of the colliding hadrons, would allow the study of gluon parton distribution functions. Thus, the SPD experiment is a powerful tool for verification of theoretical models and gaining deeper insight into the structure of matter. The SPD experiment is designed to ensure high precision measurements of total and differential cross sections and polarization with good particle identification. That is why it is extremely important to have reliable predictions for experimentally measured cross sections prior to planning experimental data acquisition routines. The presented functional self-similarity approach provides the construction of a solution quantitatively describing angular, energy and  $A$ -dependences of inclusive production cross sections for hadrons in relativistic nuclear collisions. It is applied for quantitative estimation of  $J/\psi$ , and  $D$  meson production in the conditions of the SPD experiment at NICA accelerator complex with heavy and light nuclei. The results can be used for simulation of SPD detection system operation and optimization as a part of preparation for the physics run at the facility.