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## Small- $p_T$ production of $J/\psi$ mesons within Soft Gluon Resummation Approach

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Prompt heavy quarkonium production is well described within the collinear parton model in the next-to-leading order of perturbative QCD at kinematical region of  $p_T \gg M$  where  $M$  is a mass of a quarkonium state. But the region of small  $p_T$  is still being researched and the factorisation approach which is valid here is TMD-factorisation (transverse-momentum dependent). We studied  $J/\psi$  production in collision of protons at  $\sqrt{s} = 200, 27$  and  $19.4$  GeV. Certainly, we used Nonrelativistic QCD (NRQCD) as a standard hadronisation model for charmonium production, and we extracted nonperturbative matrix elements for octet color states of the NRQCD from a set of experimental data on prompt  $J/\psi$  production because color singlet model can't be considered as sufficient for experimental data description.

The TMD approach is a general factorisation model for  $p_T \ll M$  region [1]. One of the realisations of the TMD-factorisation is a so called Soft Gluon Resummation approach [2] where soft gluon emission by partons is considered, evolution of the TMD parton distribution functions is controlled by the Collins – Soper equations [3] though the TMD distribution is partly reduced to the collinear one. We perform our study at the LO+LL approximation for now. We describe data from PHENIX Collaboration at  $\sqrt{s} = 200$  GeV and from NA3 Collaboration at  $\sqrt{s} = 19.4$  GeV and do predictions for future SPD NICA experiments at  $\sqrt{s} = 27$  GeV. We considered both gluons and quarks as initial partons, we also estimated a contribution of  $P$ -wave charmonium production and calculated polarised  $J/\psi$  production as an angular coefficient  $\lambda$ . The Inverse-Error Weighting Scheme [4] is used as an approach for matching of collinear and TMD factorisations.

References:

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