

# XXV International Baldin Seminar on High Energy Physics Problems "Relativistic Nuclear Physics and Quantum Chromodynamics"



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on High Energy Physics Problems  
*Relativistic Nuclear Physics & Quantum Chromodynamics*

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## ASSOCIATED $J/\psi + \gamma$ PRODUCTION IN HIGH-ENERGY LIMIT OF QCD

Thursday, 21 September 2023 10:00 (20 minutes)

The associated production of  $J/\psi + \gamma$  in proton-proton collisions is discussed theoretically for about 30 years [1], so it is relevant to make predictions for modern colliders energy: NICA (27 GeV), RICH (200 GeV), LHC (13 TeV). The differential cross section predictions were performed analytically and also using the KaTie event generator [2] both in an improved Color Evaporation Model [3] and NRQCD approach [4] at the first time with two different high-energy factorization models: the conventional Collinear Parton Model and the parton Reggeization approach. The parton Reggeization approach is based on the modified Kimber-Martin-Ryskin model for unintegrated parton distribution function [5,6] and Lipatov's effective field theory [7].

[1] Doncheski M. A., Kim C. S. Associated  $J/\psi + \gamma$  production as a probe of the polarized gluon distribution // Physical Review D. -1994. -vol. 49. -n. 9. -pp. 4463.

[2] Hameren A. KaTie: For parton-level event generation with kT-dependent initial states // Computer Physics Communications. -2018. -vol. 224. -pp. 371-380.

[3] Fritzsche H. Producing heavy quark flavors in hadronic collisions. A test of quantum chromodynamics // Physics Letters B. -1977. -vol. 67. -n. 2. -p. 217-221.

[4] Bodwin G. T., Braaten E., Lepage G. P. Rigorous QCD analysis of inclusive annihilation and production of heavy quarkonium // Physical Review D. -1995. -vol. 51. -n. 3. -p. 1125.

[5] M. A. Kimber, A. D. Martin, and M. G. Ryskin Unintegrated parton distributions and prompt photon hadroproduction // Eur. Phys. J. - p. 12, 655 (2000)

[6] M.A. Nefedov, V.A. Saleev High-Energy Factorization for Drell-Yan process in  $pp$  and  $p\bar{p}$  collisions with new Unintegrated PDFs, Phys. Rev. D 102 (2020), 114018

[7] L. N. Lipatov, Nucl. Phys. B 452, 369 (1995).

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