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Production of 1S, 2S, 1P quarkonium state production in light-cone $k_\perp$-factorization approach

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We review our calculations of η_c(1S,2S) prompt production in proton-proton collisions at $\sqrt{s} = 7\,, 8\,, 13\,\mathrm{TeV}$, as well as χ_{c0}(1P) and χ_{b0}(1P). The matrix element of the $g^*g^* \to \mathcal{Q}$ is found by taking into account the proper colour factors and coupling constant to quarkonia electromagnetic form factors for $\gamma^*\gamma^* \to \mathcal{Q}$. The space-like form factors for both off-shell photons are obtained using the light-cone potential approach for the wave functions of $c\bar{c}$ or $b\bar{b}$ bound states.

Theoretical uncertainties of our approach are found by performing the analysis with two different unintegrated gluon densities and with five distinct models of the $Q\bar{Q}$ interaction potentials consistent with the meson spectra. We have found rather different results for discussed potential models. In the case of the 1P state, we considered separately transversal as well longitudinal contribution to the differential cross section in transverse momentum of the meson.

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