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Charmonia Production in $W \rightarrow c c D_s$ Decays

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In the presented paper production of charmonium state Q in exclusive $W \rightarrow QD_s^{(*)}$ decays is analyzed in the framework of both leading order Nonrelativistic Quantum Chromodynamics (NRQCD) and light-cone expansion (LC) models. Analytical and numerical predictions for the branching fractions of these decays in both approaches are given. The typical value of the branching fractions is $\sim 10^{-11}$ and it turns out that the LC results are about 4 times larger than NRQCD ones, so the effect of internal quark should be taken into account. Some estimates of color-octet contributions are presented and it is shown, that these contributions could be comparable with color-singlet results.

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