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Light quark decays of doubly heavy baryons in light front approach

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We explore the semileptonic and nonleptonic decays of doubly heavy baryons ($\Omega_{cc}^{(*)+}$, $\Omega_{bb}^{(*)0}$, $\Omega_{bc}^{(*)-}$, $\Omega_{bc}^{\prime 0}$) induced by the $s \rightarrow u$ transition. Hadronic form factors are parametrized by transition matrix elements and are calculated in the light front quark model. With the form factors, we make use of helicity amplitudes and analyze semileptonic and nonleptonic decay modes of doubly heavy baryons. Benchmark results for partial decay widths, branching fractions, forward-backward asymmetries and other phenomenological observables are derived. We find that typical branching fractions for semileptonic decays into $\ell\bar{\nu}$ are at the order $10^{-7} - 10^{-8}$ and the ones for nonleptonic decays are at the order 10^{-5} , which are likely detectable such as in LHCb experiment. With the potential data accumulated in future, our results may help to shape our understanding of the decay mechanism in the presence of two heavy quarks.

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