

# $B_{(s)} \rightarrow D_{(s)}^{**}$ form factors in HQEFT and model independent analysis of relevant semileptonic decays with NP effects

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The form factors of  $B_{(s)}$  decays into P-wave excited charmed mesons (including  $D_0^*(2300)$ ,  $D_1(2430)$ ,  $D_1(2420)$ ,  $D_2^*(2460)$  and their strange counterparts, denoted generically as  $D_{(s)}^{**}$ ) are systematically calculated via QCD sum rules in the framework of heavy quark effective field theory (HQEFT). We consider contributions up to the next leading order of heavy quark expansion and give all the relevant form factors, including the scalar and tensor ones only relevant for possible new physics effects. The expressions for the form factors in terms of several universal wave functions are derived via heavy quark expansion. These universal functions can be evaluated through QCD sum rules. Then, the numerical results of the form factors are presented. With the form factors given here, a model independent analysis of relevant semileptonic decays  $B_{(s)} \rightarrow D_{(s)}^{**} l \bar{\nu}_l$  is performed, including the contributions from possible new physics effects. Our predictions for the differential decay widths, branching fractions and ratios of branching fractions  $R(D_{(s)}^{**})$  may be tested in more precise experiments in the future.

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