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Semileptonic decays to excited charmed mesons in the Standard Model and the type II 2HDM ($15' + 5'$)

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Semileptonic decays of B -mesons into excited charmed mesons of the $1P$ quadruplet are investigated in the context of the Standard Model and the type II two-Higgs doublet model. Predictions for differential branching fractions as a function of the four-momentum transfer squared are presented for the charmed meson either being a $D2$, $D1$, $D1'$ or $D0$ -meson, as well as predictions for the ratios of the semi-tauonic and light lepton semileptonic branching fractions. These predictions rely on the determination of the leading Isgur-Wise function from the measured total branching fraction of the narrow $1P$ states and hadronic branching fractions which are connected through a factorization theorem to the semileptonic form factors at maximal recoil of the initial B -meson and excited charmed mesons. In addition, the dependence of the ratio of semi-tauonic and light lepton branching fractions on the MSSM parameters $\tan\beta$ and m_{H^\pm} is predicted for all states of the quadruplet.

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