Abstract

The Standard Model of particle physics only provides a parametrization of flavor which involves the values of the quark and lepton masses and unitary flavor mixing matrix i.e. CKM (Cabibbo-Kobayashi-Masakawa) matrix for quarks. The precise determination of elements of the CKM matrix is important for the study of the flavor sector of quarks. Here we concentrate on the matrix element $|V_{cb}|$. In particular we consider the effects on the value of $|V_{cb}|$ from possible right-handed admixtures along with the usually left-handed weak currents.

Left Right Symmetric Model provide a natural basis for right-handed current contributions and has been studied extensively in the literature but has never been discussed including flavor. In the first part of the present work an additional flavor symmetry is included in LRSM which allows a systematic study of flavor effects. The second part deals with the practical extraction of a possible right-handed contribution. Starting from the quark level transition $b \to c$ we use heavy quark symmetries to relate the helicities of the quarks to experimentally accessible quantities. To this end we study the decays $\bar{B} \to D(D^*)l\bar{\nu}$ which have been extensively explored close to non recoil point. By taking into account SCET (Soft Collinear Effective Theory) formalism it has been extended to a maximum recoil point i.e. $v \cdot v' \gg 1$. We derive a factorization formula , where the set of form factors is reduced to a single universal form factor $\xi(v \cdot v')$ up to hard-scattering corrections. Symmetry relations on form factors for exclusive $\bar{B} \to D(D^*)l\bar{\nu}$ transition has been derived in terms of $\xi(v \cdot v')$. These symmetries are then broken by perturbative effects. The perturbative corrections to symmetry-breaking corrections to first order in the strong coupling α_s are then computed at large recoil regime.