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Investigating Quark Hadron Duality Violation in inclusive semileptonic B → Xc ν l decays

Wednesday 25 September 2024 14:30 (30 minutes)

The Heavy Quark Expansion (HQE) is one of the leading tools for calculating decay rates and kinematic moments of inclusive semi-leptonic B-meson decays. The HQE is an Operator Product Expansion (OPE) in terms of the inverse of the mass of the heavy bottom quark ($1/m_b$). It introduces nonperturbative HQE parameters which can be determined using data. Using the HQE, the CKM matrix element V_{cb} has been extracted at percentage level precision from the moments of inclusive semi-leptonic B meson decays ($B \to X_c\,\overline{\nu}\,l$). The calculations upon which the theoretical estimates rely are done in terms of quarks and gluons. These are, however, not accessible for experiments. Quark Hadron Duality (QHD) allows for a translation of theoretical predictions at the quark level to experimental observables at the hadron level. Since the increased accuracy in HQE predictions up to order of $1/m_b^5$, violation of the QHD may start to become a relevant limit to the achievable precision. When QHD is violated, the OPE upon which the HQE relies stops being a valid expansion. In my talk I will show how we can derive a model for the Quark Hadron Duality Violation (QHDV) and how the violation can enter different kinematic moments of the $B \to X_c\,\overline{\nu}\,l$ decays.

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