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Inclusive $|V_{cb}|$ from q^2 moments of $B \to X_c \ell \bar{\nu}_\ell$ decays

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We present the first determination of $|V_{cb}|$ from q^2-moments of inclusive $B \to X_c \ell \bar{\nu}_\ell$ decays, with q^2 denoting the dilepton invariant mass. The q^2 moments and the total rate are reparametrization invariant quantities and depend on a reduced set of non-perturbative parameters. This reduced set opens a way to extract these parameters up to $1/m_b^4$ purely from data and thereby reducing the uncertainty on $|V_{cb}|$. The first measurement of q^2 moments have been recently reported by the Belle experiment, and Belle II is also capable of carrying out similar measurements. These provide the necessary experimental input and in this contribution we present a first determination of $|V_{cb}|$ using this method. We also explore novel approaches to incorporate theory correlations using theory nuisance parameters, which allow the fit to probe many different assumptions about the correlation structure between moments of different orders and with different selection cuts.

In-person participation

Yes

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