Looking for the new physics in the $\Lambda_c^- \to \Lambda \mu^- \bar{\nu}_\mu$ decay

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We present a model independent study of the semileptonic decay $\Lambda_c^- \to \Lambda \mu^- \bar{\nu}_\mu$ in the presence of right-handed neutrinos, focusing on possible new physics contributions to the second-generation transition $\bar{c} \to \bar{s} \mu^- \nu_\mu$. Our analysis is carried out within the Standard Model Effective Field Theory (SMEFT) framework, where we parameterize new physics through a set of vector and scalar four-fermion operators. Using currently available measurements, we perform a global fit of the effective operators employing a χ^2 minimization method. To assess the phenomenological impact of the allowed parameter space, we study the differential branching fraction, forward–backward asymmetry, and the polarization asymmetries of both the Λ and muon. In addition, we investigate two lepton flavor universality (LFU) observables $A_{FB}^{\mu e}$ and $R_\Lambda^{\mu e}$. Our results highlight the potential sensitivity of these observables to new physics effects, and we emphasize the role of future measurements of $\Lambda_c^- \to \Lambda \mu^- \bar{\nu}_\mu$ at LHCb and Belle II in further constraining or uncovering such contributions.