

Analysis of the semileptonic $B_c \rightarrow D_s^{(*)}(\mu^+\mu^-, \nu_\mu\bar{\nu}_\mu)$ decay modes in the effective field theory approach

Thursday 30 May 2024 14:45 (15 minutes)

We study the exclusive semileptonic $B_c \rightarrow D_s^{(*)}(\mu^+\mu^-, \nu\bar{\nu})$ decay modes mediated by $b \rightarrow s$ quark level transitions in the Effective field theory formalism. There are discrepancies between the experimental measurements and the Standard Model predictions in various observables associated with the $B \rightarrow (K, K^*, \phi)\ell\ell$ processes. On the other hand, a very recent measurement of the branching ratio of the $B \rightarrow K\nu_\ell\bar{\nu}_\ell$ process observed by Belle - II Collaboration indicates a 2.8σ deviation above the Standard model prediction. We constraint the parameter space in the language of new physics couplings and then analyse the observables such as the branching ratio, forward-backwards asymmetry, lepton polarisation asymmetry, etc. In addition, we test the lepton non-universality observable associated with the $B_c \rightarrow D_s^{(*)}\mu^+\mu^-$ process. Being not yet observed in the experiment, we provide the predictions and comment on the observables of the $B_c \rightarrow D_s^{(*)}(\mu^+\mu^-, \nu_\mu\bar{\nu}_\mu)$ process in the SM, and in the new physics as well.

Primary author: Dr MOHAPATRA, Manas Kumar (University of Hyderabad, Hyderabad, India)

Co-authors: Mr YADAV, AJAY KUMAR (Central University of Karnataka, Kalaburgi, India); Dr SAHOO, Suchismita (Central University of Karnataka, Kalaburgi, India)

Presenter: Mr YADAV, AJAY KUMAR (Central University of Karnataka, Kalaburgi, India)

Session Classification: Parallel - 8

Track Classification: Rare decays of hadrons and leptons