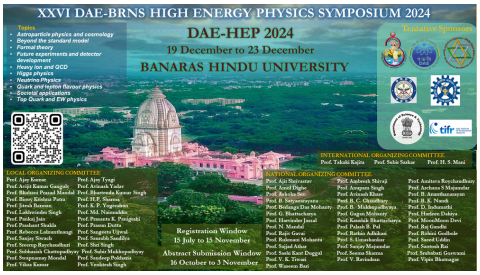

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Study on $B_c \to J/\psi(\eta_c)$ and $B_c \to \chi_{c0,1}(h_c)$ semileptonic channels in modified perturbative-QCD framework

This study investigates the decay modes of the B_c meson, focussing on semileptonic decays into S and P wave charmonia. The primary objective is to extract the shape parameter of the B_c meson distribution amplitude through a data-driven approach, utilizing $B_c \to \eta_c, J/\psi$ form factors in modified perturbative QCD framework. Further, by employing heavy quark spin symmetry, shape of $B_c \to \eta_c$ form factor is derived from existing lattice results of $B_c \to J/\psi$ form factors, giving a model-independent prediction of LFUV observable $R(\eta_c) = 0.304(36)$, which we have found to be in good agreement with previous results. Additionally, we have extracted the decay constants of P wave charmonium states, χ_{c0}, χ_{c1} and h_c through their radiative decay modes, providing a data-driven alternative to existing model dependent values, enabling us to use them as inputs to predict the $B_c \to \ P$ wave form factors at $q^2 = 0$ within the modified perturbative QCD framework. Subsequently, utilizing the shapes of the $B_c \to \eta_c$ and J/ψ form factors, we have obtained q^2 distribution of the $B_c \to \chi_{c0}, \chi_{c1}$ and h_c form factors through pole expansion parametrization, using which we obtain predictions of LFUV observables $R(\chi_{c0}) = 0.195(4)$, $R(\chi_{c1}) = 0.129(7)$ and $R(h_c) = 0.109(4)$.

Field of contribution

Phenomenology

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