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Analysis of the semileptonic decay $\Lambda_c \to ne^+\nu_e$

The semileptonic weak decay process of the Λ_c baryon to the neutron $\Lambda_c \to ne^+\nu_e$ is examined. The transition form factors are investigated with light-cone QCD sum rules. The differential decay rate is obtained in the dynamical area by fitting the sum rules-allowed results with the dipole formula. The decay width and the branching ratio are estimated to be $\Gamma(\Lambda_c \to ne^+\nu_e) = (1.69 \pm 0.23) \times 10^{-13}$ GeV and $\mathrm{Br}(\Lambda_c \to ne^+\nu_e) = 5.1 \pm 0.7\%$, respectively.

Summary

The semileptonic decay of the Λ_c baryon is a useful mode to test the standard model and the strong interaction. Considering the recent development in experiment on the channel $\Lambda_c \to ne^+\nu_e$, we investigate the weak decay form factors in the framework of light-cone QCD sum rules. We present the form factors on the momentum transfer in the region the sum rules are suitable. Furthermore, we fit the form factors with dipole formula and extrapolate them into the whole dynamic region. The differential decay rate is given in the dynamic region. The decay rate is obtained by integrating the differential decay rate in the dynamic area to be $\Gamma(\Lambda_c \to ne^+\nu_e) = (8.57 \pm 0.41) \times 10^{-15}$ GeV and the branching ratio is estimate in aid of the mean life time of the Λ_c baryon to be $\mathrm{Br}(\Lambda_c \to ne^+\nu_e) = 0.26 \pm 0.01\%$

Primary author: Mr LI, chengfei (National University of Defense Technology)