

Exclusive c to s, d semileptonic decays of ground-state spin-1/2 and spin-3/2 doubly heavy cb baryons

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We evaluate the semileptonic decays of ground-state spin-1/2 and spin 3/2 doubly cb baryons driven by a c to s, d transition at the quark level. Due to the finite value of the quark masses, the hyperfine interaction between the light and any of the heavy quarks can admix both $S=0$ and $S=1$ components into the wave function for spin-1/2 cb baryons. We have shown in previous works [1-3] the relevance of mixing in b to c semileptonic and electromagnetic decay involving those states. We find important corrections in this case as well, as large as a factor 2 in some cases. Besides, we have derived for the first time HQSS relations for the hadronic amplitudes that are valid in the limit of very large heavy quark masses and near zero recoil. HQSS imposes constraints on the form factors that are well satisfied by our calculation. With the use of HQSS we have derived approximate, but model independent, predictions for ratios of decay widths. Our values for those ratios evaluated within our model agree with the HQSS motivated predictions at the level of 10% in most of the cases. We expect those predictions to hold to that level of accuracy in other approaches.

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[1] C. Albertus, E. Hernandez, J. Nieves, Phys. Lett. B 683 (2010) 21

[2] C. Albertus, E. Hernandez, J. Nieves, Phys. Lett. B 690 (2010) 265

[3] C. Albertus, E. Hernandez, J. Nieves, Phys. Lett. B 704 (2011) 499

[4] C. Albertus, E. Hernandez, J. Nieves, Phys. Rev. D 85 (2012) 094035

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