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Origin of a large CP asymmetry in $B^{+-} \rightarrow K^{+-} K^+ K^-$ decays

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Large CP-violating asymmetry effects in the

$B^{+-} \rightarrow K^{+-} K^+ K^-$ decays have been predicted in the QCD factorization model [1].

The model includes strong $K^+ K^-$ final-state long-distance interactions in the S-, P-, and also (in the recent analysis) D- wave two-body states.

The S-wave two-body unitarity conditions involve interchannel couplings of the kaon-kaon states with the intermediate states of two pions and four pions.

As a result the pion-pion to kaon-kaon rescattering effects are included in the model.

It is shown how the weak phase differences together with the existence of two different strong phases of the S-wave decay amplitudes (related to the phases of the kaon scalar strange and non-strange form factors) contribute to the CP-asymmetry in question.

The theoretical results are compared with recent experimental data of the LHCb and BABAR Collaborations [2].

References:

[1] A. Furman, R. Kaminski, L. Lesniak, P. Zenczykowski, Phys. Lett. B 699 (2011) 102.

[2] L. Lesniak, P. Zenczykowski, Phys. Lett. B 737 (2014) 201.

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