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Wave function renormalization and flavour mixing: the case for new physics

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Summary

We re-examine the issue of wave function renormalisation for unstable particles in the presence of electroweak interactions when mixing and CP violation are considered. We also analyse the renormalisation of the CKM mixing matrix which is closely related to wave function renormalisation. We show that a proper LSZ-compliant prescription leads to gauge independent amplitudes. The resulting wave function renormalisation constants necessarily possess absorptive parts, but we verify that they comply with the expected requirements concerning CP and CPT. The results obtained using this prescription are different (even at the level of the modulus squared of the amplitude) from the ones neglecting the absorptive parts in the case of top decay. The difference may be numerically relevant for present determinations of the CKM elements.

Then we proceed to consider the contribution from new physics, parametrized by an effective lagrangian with some low-energy constants. We assume that such contributions (possibly from the integration of heavy states) should be comparable con radiative corrections in the SM and try to extract possible consequences.

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