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# Study of $\tau^- \to \omega\pi^-\nu_\tau$ decay in resonance chiral theory with tensor sources

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In this work, we make a study of the $\tau^- \to \omega\pi^-\nu_\tau$ decay in the framework of low energy effective field theory.The JPG decompositions of the quark currents and the $\omega\pi$ final state show that, besides the Standard Model vector interaction, only the non-standard tensor interaction can have a non-zero contribution to the decay. To discuss its effect, a reliable calculation of the $\omega\pi$ tensor form factors is necessary. After constructing the Lagrangian of resonance chiral theory with external tensor sources, we calculate both the vector and tensor form factors with the relevant resonance couplings determined by combining the QCD short-distance constraints, the fit to the spectral function of $\tau^- \to \omega\pi^-\nu_\tau$ decay, as well as the matching between the O(p4) odd-intrinsic-parity operators after integrating out the vector resonances and the O(p6) operators of chiral perturbation theory. The new physics effect is then investigated in the distributions of the spectral function and the forward-backward asymmetry of $\tau^- \to \omega\pi^-\nu_\tau$ decay. We find that the spectral function is dominated by the Standard Model, and the non-standard tensor contribution is negligible. However, since the forward-backward asymmetry can be only generated with a non-zero tensor interaction, the observable is quite sensitive to this kind of new physics. A future measurement of the observable at the Belle II experiment as well as at the proposed Tera-Z and STCF facilities is, therefore, strongly called for to check the existence of such a non-standard tensor interaction.

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