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Low-energy limit of SMEFT applied to tau to pi pi nu_tau decays

We perform an effective field theory analysis of the $\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$ decays, that includes the most general interactions between Standard Model fields up to dimension six, assuming left-handed neutrinos. We constrain as much as possible the necessary Standard Model hadronic input using chiral symmetry, dispersion relations, data and asymptotic QCD properties. As a result, we set precise (competitive with low-energy and LHC measurements) bounds on (non-standard) charged current tensor interactions, finding a very small preference for their presence, according to Belle data. Belle-II near future measurements can thus be very useful in either confirming or further restricting new physics tensor current contributions to these decays. For this, the spectrum in the di-pion invariant mass turns out to be particularly promising. Distributions in the angle defined by the τ^- and π^- momenta can also be helpful if measured with less than 10% accuracy, both for non-standard scalar and tensor interactions.

Primary authors: Mr MIRANDA, Alejandro (Cinvestav); Dr ROIG, Pablo (Cinvestav)

Presenter: Mr MIRANDA, Alejandro (Cinvestav)

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