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Predictions on the second-class current decays $\tau^- \to \pi^- \eta^{(\prime)} \nu_\tau$

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We analyse the second-class current decays $\tau^- \to \pi^- \eta^{(\prime)} \nu_\tau$
in the framework of Chiral Perturbation Theory with Resonances.
Taking into account π^0-η-η' mixing,
the $\pi^- \eta^{(\prime)}$ vector form factor is extracted, in a model-independent way,
using existing data on the $\pi^- \pi^0$ one.
For the participant scalar form factor,
we have considered different parameterizations ordered according to their increasing fulfillment of
analyticity and unitarity constraints.
We start with a Breit-Wigner parameterization dominated by the $a_0(980)$ scalar resonance
and after we include its excited state, the $a_0(1450)$.
We follow by an elastic dispersion relation representation through the Omn\'{e}s integral.
Then, we illustrate a method to derive a closed-form expression for the
$\pi^- \eta$, $\pi^- \eta'$ (and $K^- K^0$) scalar form factors in a coupled-channels treatment.
Finally, predictions for the branching ratios and spectra are discussed emphasizing the error analysis.
An interesting result of this study is that both $\tau^- \to \pi^- \eta^{(\prime)} \nu_\tau$ decay channels
are promising for the soon discovery of second-class currents at Belle-II.
We also predict the relevant observables for the partner $\eta^{(\prime)}_{\ell 3}$ decays,
which are extremely suppressed in the Standard Model.

Summary

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