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On the scalar πK form factor beyond the elastic region

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Pion-kaon (πK) pairs occur frequently as final states in heavy-particle decays.
A consistent treatment of πK scattering and production amplitudes over a wide energy range is therefore mandatory for multiple applications:
in Standard Model tests; to describe crossed channels in the quest for exotic hadronic states; and for an improved spectroscopy of excited kaon resonances.

In the elastic region, the phase shifts of πK scattering in a given partial wave are related to the phases of the respective πK form factors by Watson's theorem.
Going beyond that, we constructed in Ref.[1] a representation of the scalar πK form factor that includes inelastic effects via resonance exchange, while fulfilling all constraints from πK scattering and maintaining the correct analytic structure.

As a first application, we considered the decay $\tau \to K_S \pi \nu_\tau$, in particular, we studied to which extent the S-wave $K_0^*(1430)$ and the P-wave $K^*(1410)$ resonances can be differentiated and provide an improved estimate of the CP asymmetry produced by a tensor operator.

[1] Von Detten, L. and Noël, F. and Hanhart, C. and Hoferichter, M. and Kubis, B.
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Hadronic decays

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