Contribution ID: **72** Type: **Invited Talk**

On the scalar πK form factor beyond the elastic region

Thursday, 16 September 2021 13:30 (20 minutes)

Nowadays, we are experimentally and theoretically pushing the boundaries of our understanding of particle physics to progressively higher energies and precisions. When searching for physics beyond the Standard model, including in CP violating observables, one often encounters observables involving multi-hadron final states, e.g., in semi-leptonic, D- and B-meson decays. In addition, the identification of exotic resonances in such final states requires control over rescattering effects. Especially for heavy particles decaying with net strangeness, it thus becomes increasingly important to also describe the abundantly appearing final state interactions of kaons and pions up to high energies. In particular a consistent description of πK scattering and production can serve as a test of Standard Model physics, can be used to search for exotic hadronic states in crossed channels and can improve the spectroscopy of exited kaon resonances.

In this talk I want to present the results of Ref. [1]. In this paper, we constructed a representation of the πK S-wave form factor using the elastic πK scattering phase shifts via dispersion relations in the elastic region, as demanded by Watson's theorem, and extended this model into the inelastic region using resonance exchange, while maintaining unitarity and the correct analytic structure.
As a first application, we successfully described the τ→KSπντ spectrum, including the highly overlapping S-wave resonance K∗0(1430) and P-wave resonance K∗(1410). In contrast to common Breit-Wigner parametrisations, which violate unitarity, our parametrisation has the correct phase behaviour build-in and fulfils unitarity by construction. For an improved separation of these resonances using future measurements, which could potentially be measured at Belle II, we further calculated forward-backward asymmetries for the different fit scenarios. In addition, we could use our results to refine the estimate of the CP asymmetry generated by tensor operators. Finally, we were able to extract the resonance properties of the K∗0(1430) and K∗0(1950) via Padé approximants.

[1] Von Detten, L. and Noël, F. and Hanhart, C. and Hoferichter, M. and Kubis, B.
"On the scalar πK form factor beyond the elastic region"
Eur. Phys. J. C 81, 420 (2021); DOI: 10.1140/epjc/s10052-021-09169-7

Presenter: NOEL, Frederic (ITP, Uni Bern)

Session Classification: Oral Presentations