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Constraining the $\pi\Sigma - \bar{K}N$ models with the $\pi\Sigma$ photoproduction data

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The measurements of $\pi\Sigma$ mass distributions in the $\gamma p \rightarrow K^+\pi\Sigma$ photoproduction reaction [1] probe the energy region of the $\Lambda(1405)$ resonance, just below the $\bar{K}N$ threshold, and provide new challenges for the theoretical models of $\pi\Sigma - \bar{K}N$ coupled channels interactions. Adopting the photoproduction model presented in [2, 3] and the chirally motivated Prague model for $\bar{K}N$ interactions [4] we performed a first time attempt on a combined fit of the K^-p low-energy data and the $\pi\Sigma$ photoproduction mass spectra, without fixing the meson-baryon rescattering amplitudes [5]. The achieved description of the photoproduction mass distributions represents a significant improvement when compared with the parameter free predictions made in [3] but remains inferior to a more comprehensive model presented in [6] that employs much larger set of adjustable parameters, some of them purely phenomenological. I will discuss our current results in view of further upgrades being made to the photoproduction kernel. Some deficiencies (or limitations) of the currently available experimental data used in our fits will be discussed as well.

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