

Study of $\bar{p}p \rightarrow \bar{\Xi}^+ \Lambda K^-$ with the $\bar{P}ANDA$ Detector

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Abstract

For a deeper insight into the mechanisms of non-perturbative QCD it is essential to understand the excitation pattern of baryons. Up to now only the nucleon excitation spectrum has been subject to systematic experimental studies, while very little is known on excited states of double or triple strange baryons.

In studies of antiproton-proton collisions the $\bar{P}ANDA$ experiment is well-suited for a comprehensive baryon spectroscopy program in the multi-strange sector. A large fraction of the inelastic $\bar{p}p$ cross section is associated to final states with a baryon-antibaryon pair together with additional mesons, giving access to excited states both in the baryon and the antibaryon channel.

For final states containing a $\bar{\Xi}^+ \Xi^-$ pair, cross sections up to μb are expected, corresponding to production rates of $\sim 10^6/d$ at a luminosity $L = 10^{31} \text{ cm}^{-2} \text{ s}^{-1}$. This study focuses on excited Ξ states decaying into ΛK^- . A strategy to reconstruct the reaction $\bar{p}p \rightarrow \bar{\Xi}^+ \Xi^*$ and its charge conjugate channel with the $\bar{P}ANDA$ detector will be presented.