

Recent results on the $K\text{-(stop)} + A \rightarrow \Sigma^{\pm} + \pi^{\mp} + A$ reaction with FINUDA

Wednesday, 7 September 2011 15:00 (20 minutes)

on behalf of the FINUDA Collaboration

The presentation deals with the study of the $K_{stop}^- A \rightarrow \Sigma^{\pm} \pi^{\mp} A'$ reaction, which is studied on light nuclei, $A = {}^6,7\text{Li}, {}^9\text{Be}, {}^{13}\text{C}$ and ${}^{16}\text{O}$. Final Σ 's and π 's are detected by using the FINUDA spectrometer, which operated at the DAΦNE e^+e^- facility (LNF). The Σ^{\pm} hyperons are reconstructed via the $n\pi^{\pm}$ decay with the neutrons detected by TOFONE, a large volume plastic scintillator array. The two final π^{\pm} mesons are reconstructed by means of the tracking device of FINUDA, which consists of 5 position sensitive layers. Final $\Sigma^{\pm}\pi^{\mp}$ pairs are selected by requiring a proper topology for the $n\pi^{\pm}$ correlated pairs, where the $n\pi^{\pm}$ pairs are requested to have Σ^{\pm} invariant mass. \\ The $\Sigma^{\pm}\pi^{\mp}/K_{stop}^-$ emission rates are reported as a function of A . These rates are discussed in comparison with previous experimental findings \cite{katz} \cite{vander-velde} and with the existing theoretical issues \cite{staronski} \cite{ohnishi}. They are also used to calculate the γ ratio ($\gamma = \Sigma^+\pi^-/\Sigma^-\pi^+$) which strongly increases when the kaon is absorbed on an in-medium proton instead of a free proton. This effect is closely related to the sub-threshold behavior of the $\bar{K}N$ interaction. \\ The momentum spectra of prompt pions and free sigmas are also discussed as well as the $\Sigma^{\pm}\pi^{\mp}$ missing mass behavior. These spectra are discussed in detail rather than the invariant masses. In this case, the $\Sigma^{\pm}\pi^{\mp}$ channel is filled by two resonances $\Sigma(1385)$ and $\Lambda(1405)$ as well as by the $\Sigma^{\pm}\pi^{\mp}$ quasi-free reaction whose phase space develops in the same region as the two resonances \cite{oset}.

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